MARCH 19, 1937

FIRST AERO WEEKLY IN THE WORLD

FLIGHT

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The AIRCRAFT ENGINEER AND AIRSHIPS

OFFICIAL ORGAN OF THE ROYAL AERO CLUB

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FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

Editor C. M. POULSEN

Managing Editor G. GEOFFREY SMITH

Chief Photographer JOHN YOXALL

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The Trend of Private Flying

THOSE who would buy a light or fairly light aeroplane, either for their own private use or for the flying club for which they are acting, will find in the present issue of *Flight* a full list of those available. The prospective buyer must, of course, first decide clearly in his own mind exactly what he wants his aeroplane to do. He must have a definite plan or programme of his flying before his eyes, and then must decide which of the specimens described in this issue will meet his own case.

The history of private and club flying dates back to the Lympne competition of 1923, when a rich newspaper offered a prize for what it was pleased to call "motor gliders." The result was rapid production of small single-seaters driven by motor cycle engines. Next year there was a more advanced competition for two-seaters, which was followed by the production of the original Moth, designed by a firm which had refused to enter for the 1924 Lympne competitions. Of the success of the Moth and its numerous progeny there is no need to write here at any length. The Moth, with 60 h.p. Cirrus engine, made possible the light aeroplane club movement, and it and its progeny have done an immense amount of touring all over the world. The present issue of *Flight* is a milestone marking the position which this movement has now reached.

At all stages of the development of this movement there has been an unknown factor at work. The De Havilland firm knew exactly what it wanted when it designed the Cirrus Moth, and consequently it met with immediate success. What it wanted, and what everybody else from the Air Ministry downwards wanted, was a club two-seater which would justify the starting and subsidising of clubs. Since then it is doubtful whether anybody, either designer or operator, would have been able to answer the question *Quo vadis?* For touring purposes it soon became apparent that 60 h.p. did not give enough reserve power, so more powerful engines were introduced, and naturally up went the cost. Presently a reaction set in and in some quarters a new start was made by going back more or less to the 1923 ideas and making much cheaper and lighter aeroplanes. Naturally, the lowest-powered types have necessarily to be single-seaters, and accordingly their market is restricted. As was commonly said at Lympne in 1923, it is not everybody who wants to go touring alone. Also, very low-powered engines often result in problems when one wants to make extended tours and meets strong head-winds.

Some designers have abandoned the discussion between the light two-seater and the ultra-light single-seater, and have boldly gone in for medium-light machines which seat four or five and will go anywhere and do anything. In such cases it is no use talking about flying for the million on an outlay of £100 or even £200. Consequently the future of the movement is still undefined.

R.A.F. Volunteer Reserve

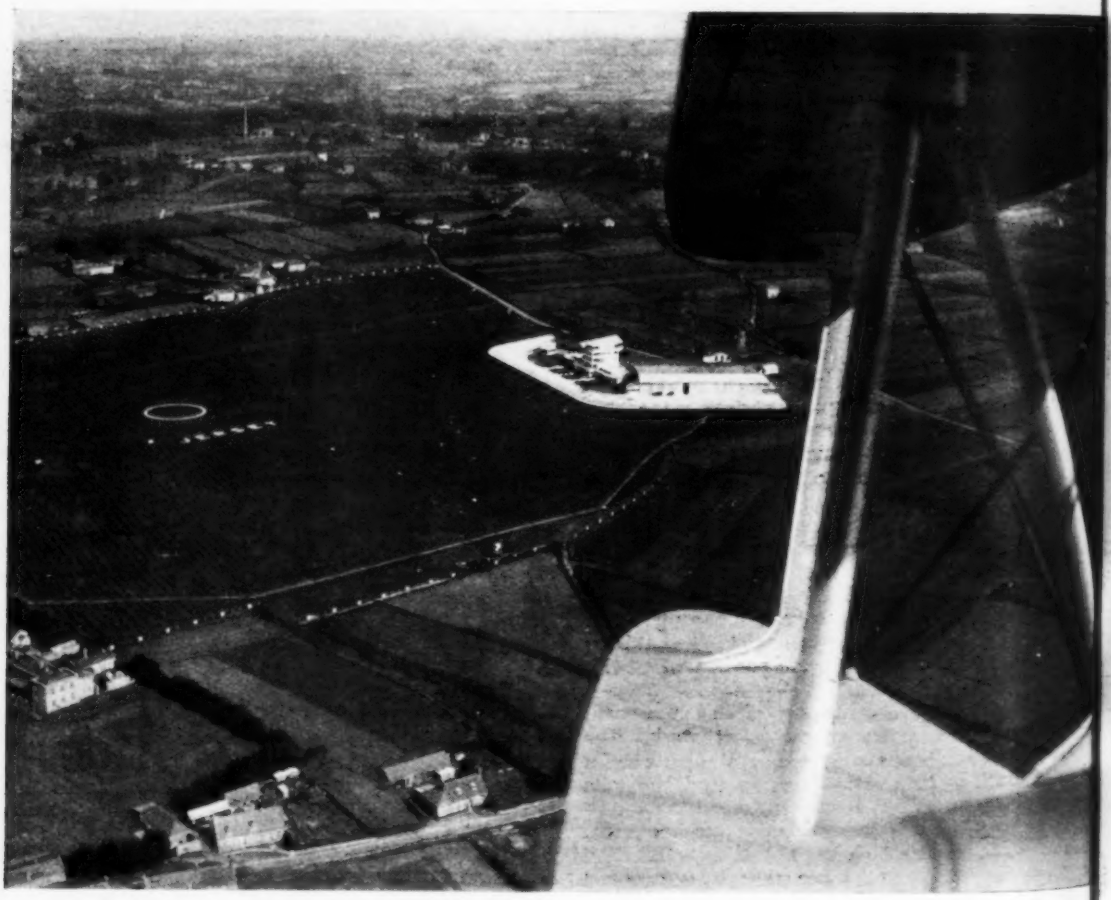
THE announcement that the Air Ministry is now prepared to receive applications for admission to the R.A.F. Volunteer Reserve will be widely welcomed. Judging from enquiries which *Flight* has received, impatience has been felt by many prospective candidates at the delay, though the delay was doubtless inevitable. To have entertained applications before the aerodrome centres and town centres were ready to undertake the training would only have invited confusion. Now 12 aerodrome centres are ready, including 3 for London, and 10 town centres. The list is given on page 280 and full information regarding the conditions of service are contained in A.M. pamphlet 62. Applications should be addressed to the Air Ministry (S.7.c), Kingsway, London, W.C.2.

The drawback to the older form of R.A.F. Reserve was that the centres for initial training and for annual continuous course were too few, and many men had to

travel an inconvenient distance from their homes to reach them. In fact, in many cases service in the old Reserve must have meant that during the year between annual trainings, the men got no flying at all, unless they could afford to pay for private flying. It is not the idea of a national reserve that only the well-to-do should be able to make themselves thoroughly proficient. The present scheme differs from the old one in that the pilot pupils who live in or near large cities will get ground instruction and flying instruction in their own locality. The present ten town centres are only a first instalment, and the scheme is to be spread gradually over the whole country. The training will go on continuously in the evenings and at week-ends throughout the year, so that when the annual training period of 15 days' continuous work comes, the men will be in trim and will not have forgotten all that they learnt at the last camp.

From the national point of view the weak point of this scheme, as of the *ab initio* side of the old Reserve, is that the pilots get no training in squadron work. You cannot make a yeomanry regiment by teaching 700 men to ride horses, or a tank battalion by collecting so many trained drivers of special motor vehicles. Nor will mere ability to fly an aeroplane make a man of much use to a squadron. As things stand, all these Volunteer Reserve pilots will have to be taught their squadron work after mobilisation, and while they are learning it they may actually hold back the squadrons to which they are posted. No reserve scheme approaches the ideal unless it provides for combined training. Perhaps in time some provision for this may be undertaken by the Air Ministry.

From the point of view of the individual this scheme is most attractive. He gets taught to fly—and what young man does not thirst for such teaching?—not only at no expense to himself, but he is actually paid for being given this great boon. He gets an annual retaining fee of £25, and when called up for service or carrying out authorised continuous training he gets the pay of his rank, which in the case of a sergeant pilot is 12s. 6d. a day. Most of the Volunteer Reservists will be sergeant pilots, but provision is made for granting commissions to a certain proportion of them. There should certainly be a rush to fill the 800 vacancies for this year, and the opening of other centres is sure to be awaited with eagerness. We must echo the hope of the Air Ministry that employers will give hearty support to this scheme by making it easy for their employees to join the Volunteer Reserve.



HOLIDAY AIRPORT. After three years of beach landings Jersey Airways now have an aerodrome to use in Jersey. This *Flight* photograph was taken through a cabin window of the first D.H.86 to come in on regular service. The possible ravages of a small insect—the Colorado beetle—at present restricts the entry of the private owner; the sea crossing from France is a matter only of fourteen miles.

The Outlook

A Running Commentary on Air Topics

The Coronation King's Cup Race

WITH the exception that the second day's race is to be across country—from Phœnix Park, Dublin, to Hatfield—instead of being flown over a short triangular course, the general regulations for the 1937 King's Cup Race, announced in this issue, do not differ fundamentally from those which have given such indifferent results during the last few years.

It may be recollected that last year considerable dissatisfaction was expressed with the system of holding an eliminating trial without handicapping and a final for the percentage that got through in the best time. In a subsequent article in *Flight* Major Alan Goodfellow explained the reasons which had influenced the Royal Aero Club in its formulation of the regulations. He came to the conclusion that, for reasons which he stated, the best that could be hoped for would be a retention of the general principle but improvements in details, notably in connection with the eliminating trial. The 1937 regulations appear to indicate that this is, in fact, a principle upon which the Racing Committee has worked in drafting this year's rules.

In his article Major Goodfellow suggested that the eliminating course should be made longer, and should include turning points at popular resorts. Last year the eliminating course was one of 612 miles, and touched turning points at Norwich, Nottingham, Bristol, and Shoreham. This year the eliminating course will be approximately 800 miles in length, and will take the competitors as far afield as Newcastle, Aberdeen, Glasgow, Newtownards, Dublin, Blackpool, and Cardiff, other towns being included as turning points.

Another point made by Major Goodfellow was that there should be a revision of the class division so as to attract a wider entry. Last year there were three classes: aircraft with engine power up to 150 b.h.p.; aircraft with more powerful engines; and twin-engined aircraft. Obviously, the Racing Committee has not seen eye to eye with Major Goodfellow on this point, as the competitors are to be divided this year merely into those with engines of up to 150 b.h.p. and those with engines totalling more than that, irrespective of the number of power plants.

As You Were!

THE place of the short triangular course in the Hatfield district used for the final in previous years is to be taken by one of 660 miles, from Dublin to Hatfield via Newtownards, Blackpool, and Cardiff. At these points there will be compulsory stops of 30 minutes, so that visitors to the aerodromes will have an opportunity to watch the competitors, but if the handicapping is good there will have been no overtaking, merely a closing-up of competitors, so thrills are hardly to be expected. Despite the "safety first" placing of the stops the straight-line courses cover quite a fair amount of sea (or mud, which is almost worse), but this risk can never be entirely eliminated.

The fact that the final is a cross-country race has one advantage and one disadvantage. The number of competitors which can be included in the final is much greater than if it were flown over a short course with numerous turns. But if weather conditions are bad, navigation will be difficult, and a close finish is hardly to be expected. The net result is likely to be another disappointment this year, although one item on the credit side is that many more people will have a chance to see the race.

INDEX TO CONTENTS OF THIS ISSUE: PAGE 252.

Air Defence of the Fleet

SIR SAMUEL HOARE, very understandably, did not go into details when he stated in the House of Commons last week that the Fleet, and particularly the Battleship Fleet, was the least attractive target that any possible enemy might select for air attack. As regards naval bases, the First Lord of the Admiralty added that, just as it was possible to concentrate a great volume of defence and counter-attack upon a small area like a battleship, so it was possible to concentrate a great volume of defence and counter-attack in the bases.

Pilots who fought in the Great War will remember how unattractive a target was a kite balloon. Round each balloon was concentrated a thick circle of Archies, machine guns, "flaming onions," and every other form of defence known in those days. Few pilots who ventured into such a hornet's nest came out without bullet holes in their aeroplane, and some suffered more severely. Despite all the defence, some kite balloons were shot down on both sides. For one thing, the gas-bags were very vulnerable. From the success of certain pilots in bagging kite balloons, some may argue that no defence can make a target invulnerable. Sir Samuel Hoare does not claim that invulnerability can be achieved for the Fleet. He admits that some ships may be sunk by air attack, just as some will be sunk by gunfire. What he does claim is that air attack on the Battleship Fleet and on naval bases will be such a dire adventure that it will not be attractive, and by implication he claims that air attack will not be able to put our Battleship Fleet out of action or prevent it from playing its part in the defence of British interests.

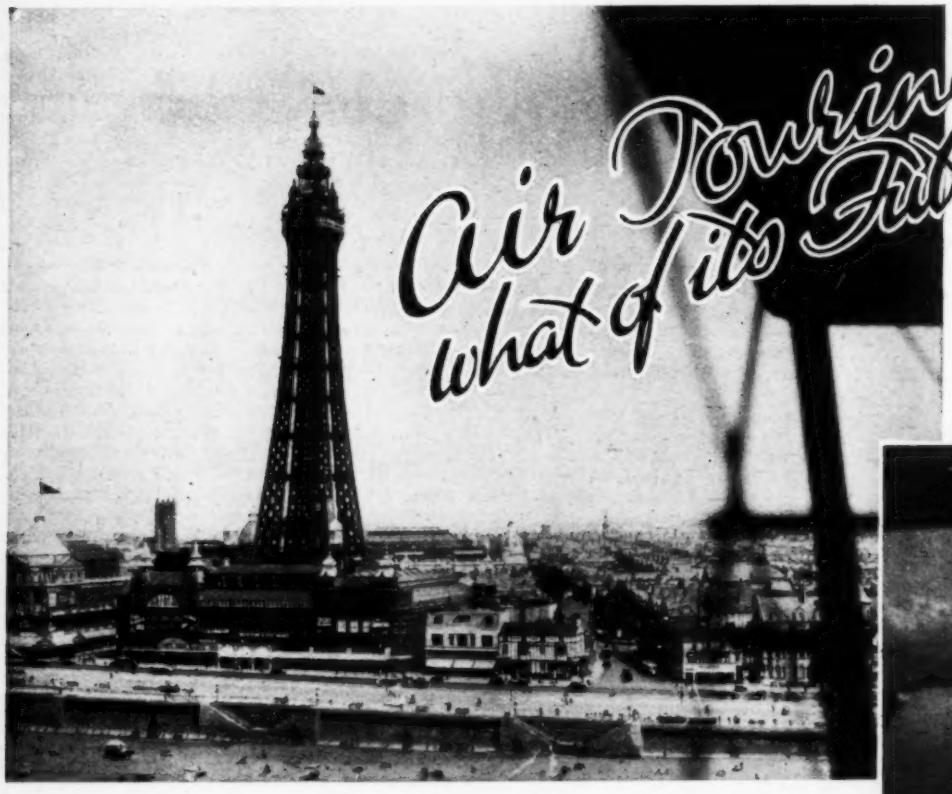
Bricks and Mortar

THOSE war-time huts and buildings were marvellous things. The contractors who put them up builded better than they knew. It is now twenty years since the war was in full swing, and yet the buildings then erected are still in use in many places. The Air Estimates (detailed in last week's issue of *Flight*) provide for replacing war-time buildings at no fewer than nineteen R.A.F. stations. Critics have sometimes attacked the Air Ministry for spending too much money on bricks and mortar, to the detriment of flying. It should be good for the souls of such critics to study Vote 4 in this year's Estimates, and if they do not spare a sigh of pity for the officers and airmen who have been condemned to live for twenty years in huts and barracks which were only meant to be temporary they must indeed have hearts of alabaster. This vote is a standing testimony to the economy which the Air Ministry has practised all these long years.

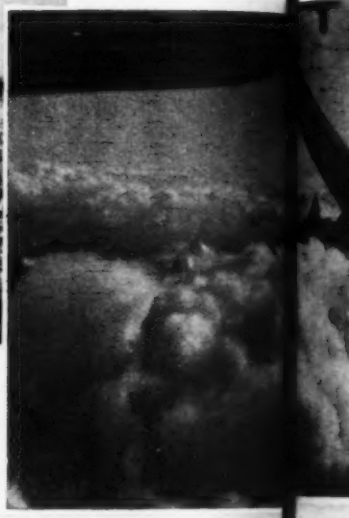
Other interesting facts appear from the details of this vote. Six new Flying Training Schools are to be built at places mostly not known to the ordinary student of British geography. The list is Brize Norton, Great Rissington, Hullavington, Shawbury, South Cerney, and Ternhill. The existing F.T. Schools have coped nobly and successfully with the rush of pilots during the expansion, but they could not have got through the work without the help of the civilian training schools. The strain will be lifted when these six new F.T. Schools are ready.

Farnborough is to have a new 7ft. wind tunnel at a cost of £23,000, and the Air Ministry is paying for two new tunnels, 7ft. and 13ft., at the N.P.L., Teddington, which will cost altogether £75,000.

DIARY OF FORTHCOMING EVENTS: PAGE 285.



Air Touring—what of its Future?



THE AEROPLANE CAN FORM THE PERFECT TOURING MEDIUM, BUT—

Major R. H. Thornton, M.C., M.A., an Enthusiastic Private Owner and Air Tourist, Constructively Criticises that Very Important "But"

TO write something really optimistic and encouraging about air touring is by no means easy. There is no point in telling a lot of silly half-truths and, anyhow, an aeronautical journal should be the last to produce the sort of cheap, popular "write-up" which, by omitting all the snags, presents the reader with a completely misleading picture.

Private air touring is still negligible in volume. And yet, from a touring standpoint, a two-seater aeroplane should be the perfect vehicle. Half the fun of touring is independence, the freedom to go when you will and where you will. A motor car gives you that independence delightfully. An aeroplane gives you that *and* something more, namely, an immeasurably increased range. It might be fun to tour the Carpathians by car, but how many of us hard-working people can possibly afford a holiday long enough to go slogging across Europe in a motor car to reach the Carpathians? In an aeroplane you can be there in the course of one long summer's day. There can only be three kinds of reason why air touring has not developed more—expense, risk and organisation.

Briefly, what is the present position under these three heads? A modern two-seater aeroplane costs as much to-day as it did ten years ago, though at that price it is both faster and more comfortable. As regards risk, engine reliability has improved steadily, for which private owners all over the world should take off their hats to the makers most concerned. The aeroplane itself, once airborne, has for years been as safe a vehicle as one could reasonably wish—in the crudest aerodynamical sense. That is to say that the odds against its "coming to pieces in your hands"

are of the order of several million to one. And yet amateur flying is quite as difficult and almost as dangerous as it was ten years ago. Finally, as regards organisation, although the restrictions and formalities are, if anything, worse, they should be balanced—as far as affects development—by the steadily growing number of equipped and reasonably "civilised" aerodromes. In any case, they are not such as to provide a deterrent to anyone who contemplates air touring but has never tried it.

Let us examine these in rather greater detail. The real expense of a private aeroplane is not so much its cost as the fact that it is an addition to, not a substitute for, other methods of transport. No one will ever be heard saying, "I'm giving up my car and buying an aeroplane." The nearest you can get to that is to say (as I do), "I do not own an expensive motor car, but I own an aeroplane and a Baby Austin"—and that costs more! But *need* it? The real point is not so much the actual first cost as the question of life and upkeep. And on this subject I believe the manufacturers of small aeroplanes make a mistake. Thinking as they do in terms of commercial pay-load, they sell you with great pride a machine which can maintain itself in the air for three hours with two 11½-stone occupants and no less than 12-14 stone of luggage. And they will tell you that the latter, for aerodynamic reasons, has *got* to be carried in a space which cannot possibly accommodate more than half that weight of boots and clothing. In other words, the pay-load is only of interest to a bullion-smuggler, if such a profession exists. My own heretical view is that about 80 pounds of weight spread over the various fittings of an average light aeroplane would not only increase its life and reduce upkeep to a minimum, but by eliminating costly alloys would materially reduce the first cost. You cannot use those 80 pounds in any other way, so why not have them back in the form of reduced anxiety and cost?

This question is really important, because all the other costs of air touring are well within the purse of thousands of people who do not fly to-day. With the freedom from landing and housing fees, which has been organised over Europe by our good friend Harold Perrin, you have little more than your petrol, oil and carnet to pay for. The latter costs you a shilling per frontier, which is far too high, but still is hardly ruinous. From my own flying accounts, which I keep carefully and do not fake, I find that insurance, hangarage all the year at home, petrol, oil, maps, carnet and incidentals come to about exactly 2d. per mile on a basis of 200 hours annual flying. That represents the total out-of-pocket expenses, apart from overhauls, and, for two people, is very cheap indeed. But if an £800 machine has got to have expert mechanics and surveyors constantly crawling over it, looking for air-cracks and taking up shrinkage, if cowlings, etc., are going to split and disintegrate before they are twelve months old and, finally, if I really have to write off the capital cost in four years or so of modest flying, then up goes the cost to 4½d. per mile and the picture is very different indeed.

Officialdom

As regards the formalities, without going into detail there are two things to be said. There are too many formalities, but, on the other hand, British amateur pilots are far too casual about them. Our various touring associations ought to be far more active than they are in the constant battle against an officialdom which itself is too old to fly; and, moreover, we, their members, ought to be solidly behind them in our readiness to carry out loyally and conscientiously such regulations as do exist. After all, these regulations are not unintelligible. What is wrong with them is that they are invented and administered by people who don't fly, won't fly, and can't see why anyone should ever want to fly. On the other hand, the average British amateur pilot is barely capable of keeping even his own private pilot's licence valid without a wet nurse to look after him. If, greatly daring, he takes a club machine away and manages to cross the Channel instead of, by mistake, the North Sea, he expects by the time he lands at le Touquet to be signing autographs rather than producing passport, licence, *log du bord*, *carnet de passages* and *carte d'identité*. In other words, he still thinks it clever to be driving an aeroplane.

And the trouble is that it *is*! The modern light aeroplane is, if anything, more dangerous than its predecessor of ten years ago in the hands of a clumsy or a rather frightened pilot. And why is he frightened? Simply because the wretched thing cannot, when desirable in dud weather, fly slowly enough. It cannot be flown safely (at any rate in bumps) at less than about 70 m.p.h. by anyone whose *whole* attention is temporarily abstracted from pilotage and concentrated, say, on recognition of a landmark. You will not get popular air touring until aeroplanes can be safely flown without any attention at all at speeds of, say, 20-25 m.p.h. We are constantly being told that aeroplanes ought to land slowly. That seems to me to be of very little consequence, although aerodynamically the

two happen to go together. But if there ever were such a thing as a fast aeroplane that could fly slowly, but yet not land slowly, I am prepared to bet that the amount of cross-country flying would go up 500 per cent. and only be limited by the output of the factory. Expense be blowed! Thousands of young fellows would give up their sports cars and their best girls and club together in threes and fours to buy such an aeroplane and experience all the independence and the fun and, yes, the thrill of getting about under their own steam, covering immense distances very cheaply and seeing something of the Europe which to-day they only read about.

Air touring has an immense future before it—in the future. But even to-day much more of it could be done at very little expense in co-operative aeroplanes, such as those of a club, by any amateur pilot who will condescend to admit that cross-country navigation is a serious science and not a casual joy-ride, and that international regulations, after all, can be studied and obeyed without sitting up all night about it. Any well-organised club ought to hire you its aircraft at normal solo rates, say, 35s. per hour, less cost of petrol and oil in England, or about 25s. net. The machine should possess its own carnet. Armed with this and the *carte d'identité* issued to its members by the Royal Aero Club, you can tour Europe free of landing fees and hangarage for forty-eight hours at each aerodrome. Your Continental petrol will be costly, say, 2s. 4d. to 2s. 6d. per gallon, but, even so, your total running costs will not exceed 42s. per hour, or 5d. per mile at 100 m.p.h., shareable between two people. That means £20 per head for a trip to Budapest and back, which seems pretty cheap touring to me.

Back to the Fold

IT is announced that the aircraft works of J. Samuel White and Co., Ltd., Cowes, which ceased aircraft construction at the end of the war, are now again in production.

They are at present engaged in high-speed production of aircraft components, including such work as fuselage structure and control frames, for which a number of important contracts have been secured.

The factory has been laid out and equipped with modern plant for the construction of complete aircraft, and has every facility for this purpose.

The Napier Meeting

"WE believe we have now passed the days of unremunerative turnover, and the orders we now have in hand entitle us to look forward to much better trading figures during the current year." This was one of the points from the speech delivered by Sir Harold Snagge, the chairman, at the annual meeting of D. Napier and Son, Ltd., last week.

Sir Harold made a detailed survey of the accounts. One point which he brought out was that the 1936 trading result showed an improvement of £26,860 on that of the previous year. Another was that the total available reserves of the company are upwards of £270,000 wholly invested in British Government securities. This Sir Harold regarded as "a not unsatisfactory figure, when it is borne in mind that all development expenditure and proper depreciation to date have been provided for, and that the company is now in production."

Airscrew Vibration

MAJOR B. C. CARTER, of the Royal Aircraft Establishment, gave a very fascinating lecture to the R.Ae.S. last Thursday on the subject of vibration in airscrew blades. In addition to the lantern slides, the lecture was illustrated by an ingenious demonstration apparatus on which a light wooden lath was caused to vibrate, a strong light thrown upon it showing very clearly the amplitude of the vibrations, the location of the nodal points, and how these changed as the frequency was varied by altering the speed of the electric motor.

It is quite impossible in a short space to give even a bare outline of a subject of such complexity, and it will have to suffice if we point out here that Major Carter and his colleagues at the R.A.E. have made extensions in the mathematical treatment of the subject, and hope to obtain experimental verification by means of new apparatus in which a small flash-lamp bulb mounted on the tip or any other desired point of an airscrew blade is used in conjunction with a motion picture film (9.5 mm.) to secure a record of blade-tip vibrations relative to the hub. So far this apparatus has been tested in the hangar only, but it is hoped ultimately to use a development of it for obtaining vibration records in actual flight.

Short Brothers' "Annual"

THE annual staff dinner of Short Bros., Rochester, was held in London recently, following a visit to the theatre by 230-odd members of the staff.

Replying to the toast of "The Firm," proposed by Mr. W. P. Kemp, director and joint works manager, Mr. Oswald Short (managing director) said he felt that the prospects were infinitely more rosy than they had ever been before. The Empire boat was no longer the property of the firm, but had become a national possession. The works were engaged upon various other machines which he felt sure would give equally good accounts of themselves. He was sorry that Mr. P. H. Harrower, chief A.I.D. inspector, was leaving the firm, but he was not losing touch entirely as he was going to Belfast, where they were beginning their new activities at Queen's Island, Belfast. In this connection Mr. Short said he would like to express his appreciation of the very hard work put in by Mr. J. H. Lower, Mr. Woolmore, Mr. W. Browning and Mr. H. G. Parker in preparing the organisation of the new works.

Before closing, Mr. Short said how sorry he was that their general manager, Mr. A. Gouge, was not able to be present because of recent illness.

Lympne Entertains

BY way of a change, the Cinque Ports Club's dinner and dance, held last Friday, were *almost* formal, partly because of the presence of an exceptional number of important guests, and partly because of the attendance of a record number of people—227, to be exact—and one must organise a crowd of such massive dimensions.

However, the affair almost immediately became as informal as usual and there were, to the relief of the majority, only two brief, but amusing and informative speeches. Mr. W. E. Davis explained how the club had gone ahead during the past year (the facts were published in last week's issue of *Flight*), welcomed the many guests—including officers of No. 601 squadron—and asked the chairman, Mr. C. W. A. Scott, to present the Parsloe Trophy, for navigation and forced landing ability, to Mr. Eric Simmonds.

The presentation having been duly carried out, Mr. Scott proceeded to reply in his own inimitable manner. Probably nobody, least of all Mr. Scott himself, could tell you exactly what he said, but it was extremely amusing, and he capped the whole thing with yet another story. Thereafter was dancing and vocal entertainment by M. Georges Seversky who, once again, had come over from Paris specially for the event. On the following day he showed, too, that he had not forgotten how to fly. The party really ended on Sunday morning—if then.

Among the many people present were three vice-presidents—Lady Braddell, Mr. Scott and Mr. C. D. Stephenson—and parties both from Brooklands and Shoreham.

IN THIS SPECIAL ISSUE:

	PAGE		PAGE		PAGE
Editorial Opinion	247	The Instructor's Day	267	Diary of Forthcoming Events	285
The Outlook	249	Glider *v.* Aeroplane	268*a*	Air Racing	277
Air Touring	250	The American Private Owner	268*d*	Royal Air Force Notes	280
British Light Aircraft	253	First Steps into the Air	269	Light Aircraft Engines	282
Cabin and Cockpit Interiors	258	Private Flying	271	Commercial Aviation	286
Imported Types in Britain	264	Cavalcade of the Clubs	273	A New Two-seater	289
Rotating-wing Aircraft	265	Light Aircraft Accessories	275		

BRITISH LIGHT AIRCRAFT REVIEWED

One- to Five-seater Types Among a Score of Makes to Fill Every Need of the Club Pilot and Private Owner

Aeronca

PROBABLY the first machine to be made which provided really serious flying for two people on a comparatively low horse-power, the Aeronca is now in production in this country. Apart altogether from the service which large numbers of these machines have given, on wheels, skis and floats, on the other side of the Atlantic, Mr. Llewellyn's flight to Johannesburg more than a year ago proved that the machine is far from being a plaything. As in the case of all low-powered machines, some allowance must be made, but once the particular technique is understood, machines like the Aeronca can be made to do practically everything which was done by more powerful light aeroplanes in the earlier days of the movement.

In the form in which it is being produced over here, the Aeronca is a side-by-side 2-seater high-wing wire-braced cabin monoplane of mixed construction. The fuselage is of welded-steel tube and the wing is of wood. Since the two occupants sit together more or less at the centre of gravity the controls are simplified by the omission of an unnecessary tail-trimming device, and a single central throttle can be reached from either seat. The machine is, of course, normally flown from the left side, but full dual is arranged, and a number of Aeroncas are already being used for inexpensive instructional purposes. The view in all essential directions is reasonably good, and it is possible to open either of the side panels if the screen is obscured in rain. Light luggage can be accommodated in a light locker at the rear of the cabin.

One or two new developments in a rather different class are likely to make their appearance after the production of this machine has proceeded apace.

The specification of the Aeronca is as follows: Span, 36 ft.; length, 20 ft.; weight empty, 629 lb.; disposable load, 437 lb.; maximum speed, 95 m.p.h.; cruising speed, 87 m.p.h.; landing speed, 33 m.p.h.; initial climb, 450 ft./min.; range, 305 miles; price, £395. Makers: The Aeronautical Corporation of Great Britain, Ltd., Walton Works, Peterborough.

The two-seater Aeronca monoplane, which is now being built in this country. (*Flight* photograph.)

Autogiro

DURING the past year the development of the Autogiro moved forward yet another step when the "direct-start" type, on which experiments have been carried out over a long period, made its first public appearance. Attention was largely directed to the little Weir single-seater (described elsewhere under the 'Experimental" heading), but one of the C.30 machines was also modified and gave a very good account of itself.

To the Cierva Autogiro Co., each new type is, however, considered only as another move towards a clearly defined goal, and for the moment the well-known C.30 type can be considered as the standard version of the Autogiro. It continues to do good work, and is performance is, in many respects, considerably superior to that of the normal fixed-wing aeroplane. Height, for instance, can be maintained at a speed as low as 15 m.p.h., and the landing is made at 5 m.p.h., or less. Autogiro flying requires a certain special technique, and training can be obtained at Hanworth and at one or more schools elsewhere.

In general, however, this technique can be picked up by the fixed-wing pilot in three hours' flying or so. The main differences concern the necessary sequence of actions before the take-off, and the

Although representing only another stage in the gradual development of the Autogiro, the C.30 direct-control model has now been in successful use for several years.

(*Flight* photograph.)

method of making the specialised approach which, with such a very low landing speed, must, naturally, be terminated dead into wind. Although the landing speed is very low, a strong wind need not worry the pilot, provided that he holds the stick forward while turning left out of wind and before applying the rotor brake. Once the rotor has slowed down the machine has, of course, no lift.

The Cierva Autogiro Co., Ltd., of Bush House, Aldwych, London, W.C.2, holds the master patents for the machine and grants licences to other firms when necessary.

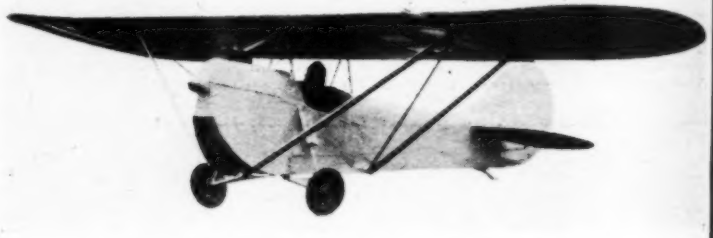
Baynes

AN entirely new light aeroplane, with side-by-side seating and two Carden-Ford engines driving pusher airscrews, has recently been introduced by Carden-Baynes Aircraft. The whole design is one which has been suggested on more than one occasion during the past two or three years by *Flight*. Details have been released for this week, and a complete description appears on pp. 290-291 of this issue.

Brawny

ORIGINALLY produced as the Perman Parasol, the Brawny monoplane is an orthodox strut-braced single-seater powered by a 32 h.p. Carden-Ford engine. Simplicity is the keynote of the design, and the machine is intended to appeal not only to the private owner, but to those clubs which wish to offer exceptionally cheap solo flying to their members.

The specification of the Brawny is as follows: Span, 25 ft. 6 in.; length, 15 ft. 6 in.; maximum speed, 80 m.p.h.; cruising speed, 70 m.p.h.; landing speed, 30 m.p.h.; range, 200 miles; price, £195. Makers: Broughton Blayney Aircraft Co., Ltd., London Air Park, Feltham, Middlesex.



Inexpensive simplicity : the Brawny monoplane in flight.

British Aircraft

DURING the past year or two the now well-known B.A. Swallow has been adopted by quite a number of clubs and schools for training purposes. The experience of various instructors suggests that, though exceptionally easy to fly, the Swallow provides as good a flying basis for a pupil as any other machine, and its value is increased by the fact that there is a tendency everywhere towards the low-wing cantilever monoplane.

From the owner's point of view the machine's easy-flying and safe characteristics are coupled with an extremely useful performance when its comparatively low power and low landing speed are taken into consideration. With its large screens the pilot and passenger are provided with the draught-proof features of the cabin machine while retaining the fresh-air atmosphere. It is possible to fly in comfort from either seat without helmet or goggles, and the presence of a cockpit starter, in the case of the Pobjoy-engined model, enables one to stop the engine completely and enjoy flying *per se*. For really serious long-distance touring the range is amply good when fitted with either engine.

Little need be said about the Swallow's viceless behaviour at or near the stall, and in smooth weather it is quite prac-

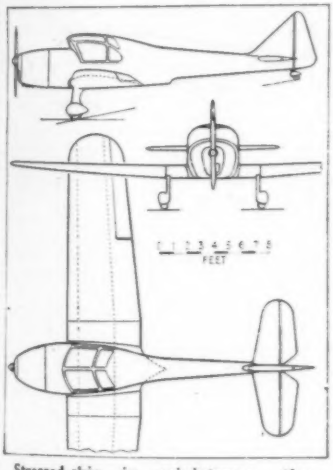
Best known of the British Aircraft range, the Swallow has made an enviable reputation for itself both as a trainer and a private owner's machine. It may be fitted either with a Pobjoy or a Cirrus engine. (*Flight* photograph.)

ticable to adjust one's approach by the simple expedient of allowing the machine to sink or to glide properly, according to whether one is overshooting or undershooting an aerodrome or field.

The specification of the Pobjoy-engined Swallow is as follows: Span folded, 15 ft. 1 in.; length, 27 ft.; weight empty, 930 lb.; disposable load, 570 lb.; maximum speed, 112 m.p.h.; cruising speed, 98 m.p.h.; landing speed, 30 m.p.h.; initial rate of climb, 800 ft./min.; range, 440 miles; price, £725.

In a somewhat different class there is the three-seater Eagle, which is normally fitted with a 130 h.p. Gipsy Major. As in the case of the Swallow, this machine is of wooden construction, but here the occupants sit in a well-windowed and adequately soundproofed cabin, and the undercarriage is of a retractable type. The Eagle has the reputation of being one of the quietest single-engined machines to be found, and a new model is expected to be produced in which the minor responsibility of undercarriage retraction has been eliminated.

The specification of the Eagle is as follows: Span folded, 14 ft. 10 in.; length, 25 ft.; weight empty, 1,450 lb.; disposable load, 950 lb.; maximum speed, 148 m.p.h.; cruising speed, 130 m.p.h.; landing speed, 45 m.p.h.; initial rate of climb, 700 ft./min.; range, 650 miles; price, £1,250. Makers: The British Aircraft Mfg. Co., Ltd., Hanworth Aerodrome, Feltham, Middlesex.



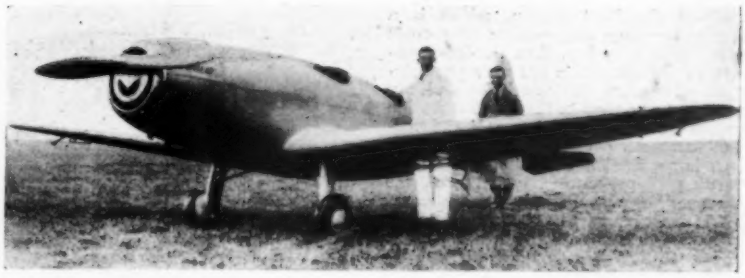
Stressed-skin in miniature: the C.W. Cygnet Minor, which should shortly be flying.

C.L.W.

FORMED in 1935 for the purpose of manufacturing machines with a patent type of wing construction, the C. L. W. Co. produced its first machine last year. This was a tandem-seater low-wing monoplane designed primarily for training, and the production of this machine should shortly be started.

The Curlew, as it is known, has been planned largely for the instruction of those pilots who will eventually pass on to the modern type of clean monoplane with a comparatively high wing loading and split flaps. Any engine up to 130 h.p. may be specified for the machine, though the prototype is fitted with a Niagara III. During tests a terminal velocity of 305 m.p.h. was reached without failure of any kind.

The specification of the Curlew is as follows: Span, 27 ft.; length, 21 ft. 6 in.; weight empty, 970 lb.; disposable load, 530 lb.; maximum speed, 135 m.p.h. Makers: C.L.W. Aviation Co., Ltd., Gravesend Airport, Kent.



A new trainer for the new technique: the Pobjoy-engined Curlew monoplane.

C.W.

WHILE, on the other side of the Atlantic, there is a definite trend towards the use of stressed-skin construction, even for smaller types, the C. W. Cygnet is interesting as being the first light machine in this country to be so constructed. By this time the Cygnet should have made its flying tests, and it will be interesting to see how the machine compares in the matter of performance and payload with the more normal wooden machines.

The Cygnet is a side-by-side seater low-wing cabin monoplane for the private owner or club, and is designed to be fully aerobatic. The constructional methods were described and illustrated in *Flight* of December 10, 1936, and at that time it was claimed that the wing, with ailerons, flaps and controls, weighed only 2 lb./sq. ft.

The prototype Cygnet Minor is being fitted with a Cirrus engine, but an alternative unit is the Pobjoy Niagara.

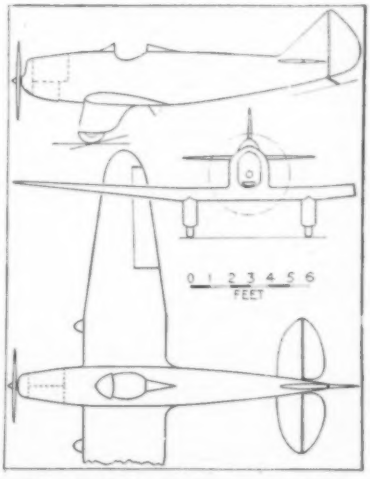
Later on, work will be started on a small twin-engined monoplane for luxury private ownership.

The specification of the Cygnet Minor and the estimated performance figures are as follows: Span, 34 ft. 6 in.; length, 24 ft. 2½ in.; weight empty, 850 lb.; disposable load, 600 lb.; maximum speed, 125 m.p.h.; cruising speed, 110 m.p.h.; landing speed, 35 m.p.h.; range, 600 miles; price (provisional), £795. Makers: C.W. Aircraft, Ltd., Montrose Avenue, Slough Trading Estate, Bucks.

Chilton

BY the time this issue appears the new Chilton monoplane, which is being built under the guidance of the Hon. A. W. H. Dalrymple and Mr. A. R. Ward, should be flying. This ultra-light machine is a low-wing single-seater monoplane with plywood skin which is at present fitted with a 32 h.p. Carden Ford engine. Great efforts have been made to see that the machine is as clean as possible and, in order to nullify the inevitable flat approach effect, flaps are being fitted.

The specification and the estimated performance figures of the Chilton are as follows: Span, 24 ft.; length, 18 ft.; weight empty, 380 lb.; disposable load, 250 lb.; maximum speed, 110 m.p.h.; cruising speed, 100 m.p.h.; landing speed, 32 m.p.h.; initial rate of climb, 500 ft./min.; range, 400 miles; price (provisional), £298. Makers: Chilton Aircraft Co., Chilton, Hungerford, Berks.



The Chilton monoplane, a high-efficiency ultra-lightweight with a Carden-Ford engine.

Dart

QUITE one of the most interesting ultra-light machines which have been designed to be flown by the novice

Designed to be flown by the novice pilot: the Dart Kitten, at present fitted with a 27 h.p. Ava flat-four two-stroke engine. (*Flight* photograph.)

pilot is the Dart Kitten, which is a sturdy low-wing single-seater at present fitted with a 27 h.p. Ava flat-four two-stroke. The machine has very good flying and control characteristics and, by means of a change in the aerofoil section from root to tip, has very safe and controllable stall.

A large number of pilots with widely varying experience have flown the machine without difficulty. The cockpit is roomy, and the whole structure is of a robust and straightforward nature.

The firm was originally founded in 1934 under the name of Zander and Weyl, and have had considerable experience in the manufacture of sailplanes and the like. In addition to the Kitten they have made two other ultra-light aeroplanes known as the Pup and the Flittermouse. Both are pusher high-wing monoplanes designed not only to have safe flying characteristics, but also to give the pilot a maximum range of visibility in all directions. Whereas the former has a normal type of fuselage and a pronounced sweep back, the latter is more of the true pusher type with a boom-supported tail.

The specification of the Kitten is as follows: Span, 31 ft. 9 in.; length, 21 ft. 4 in.; weight empty, 440 lb.; disposable load, 242 lb.; maximum speed, 75/80 m.p.h.; cruising speed, 65 m.p.h.; stalling speed, 37 m.p.h.; initial rate of climb, 400 ft./min.; range, 260 miles; price, £345. Makers: Dart Aircraft, Ltd., 29, High Street North, Dunstable, Beds.

De Havilland

WITH a longer experience than any other firm in the design and manufacture of light aeroplanes, the De Havilland firm decided, some two years ago, that the days of the open tandem two-seater were numbered and that the time had come to produce a new type which would suit both the private owner and club. After the Puss and Leopard came the Hornet Moth, designed to provide the best possible compromise between the somewhat conflicting demands of a large number of prospective purchasers.

The Hornet Moth, particularly in its latest form, is easy to fly and land—to the point of being adequately controllable in the air on either stick or rudder alone—it is quiet, it has a light and roomy cabin which is easily entered from either side, and there is ample luggage space. More important still, this machine can, with two heavy occupants and their luggage, be taken safely out of almost any field in which it is possible to land. It has, moreover, a range which is more than adequate for Continental or even for extra-Continental touring. More recently it has been put on floats for Canadian use and in this form has shown itself to have an exceptionally good performance.

As might be expected, the Hornet Moth has an excellent performance as a seaplane. With two occupants and more than 100 lb. of luggage, the machine has a range of 316 miles while cruising at 95 m.p.h. Tests on a Canadian lake, lying some 1,500 ft. above sea level, showed that the Hornet was off a glassy surface after a 30-second run.

The specification of the Hornet Moth is as follows: Weight empty, 1,255 lb.; disposable load, 695 lb.; folded span, 9 ft. 9 in.; length, 25 ft.; maximum speed, 121-124 m.p.h.; cruising speed, 103-105 m.p.h.; landing speed, 40 m.p.h.; climb to 5,000 ft., 8.25 min.; range, 750 miles; price, £775.

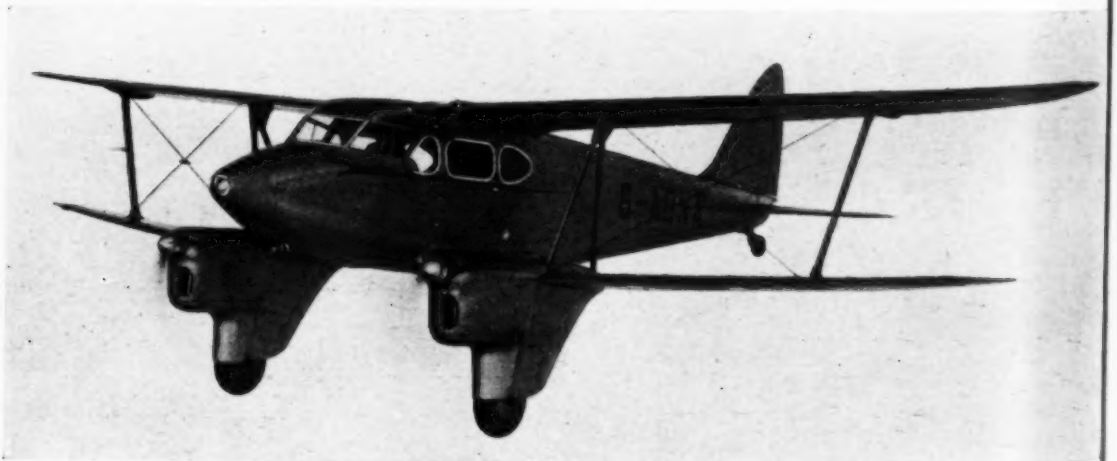
Originally produced for luxury private ownership and charter work, the D.H. Dragonfly has, during the past year, been used very successfully for twin-engined training. Its flying characteristics sufficiently resemble those of its larger brothers to make it an excellent machine for this purpose, particularly as it is equipped with flaps, Sperry blind-flying equipment, and so forth. Furthermore, a hood arrangement can be installed to enable the pupil to become accustomed to real blind flying in a full-sized machine.

For the private owner the Dragonfly is luxuriously equipped, and the normally skilful amateur has little difficulty in being passed off on the machine after three or four landing circuits. Apart from furnishing comfort, exhaust and airflow noises have been reduced to such a remarkable extent that it is possible to talk in a normal tone of voice. For more serious flying two-way radio can, of course, be fitted.

The specification of the Dragonfly is as follows: Weight empty, 2,500 lb.; disposable load, 1,500 lb.; span, 43 ft.; length, 31 ft. 8 in.; maximum speed, 144-147 m.p.h.; cruising speed, 127-130 m.p.h.; climb to 5,000 ft., 7.5 min.; range, 885 miles.

For *ab initio* and intermediate training the now well-known Tiger Moth has lost none of its popularity. Apart altogether from those used at clubs and schools in this country, there are, for instance, some sixty of these machines in daily use at the Irani military flying school at Teheran alone.

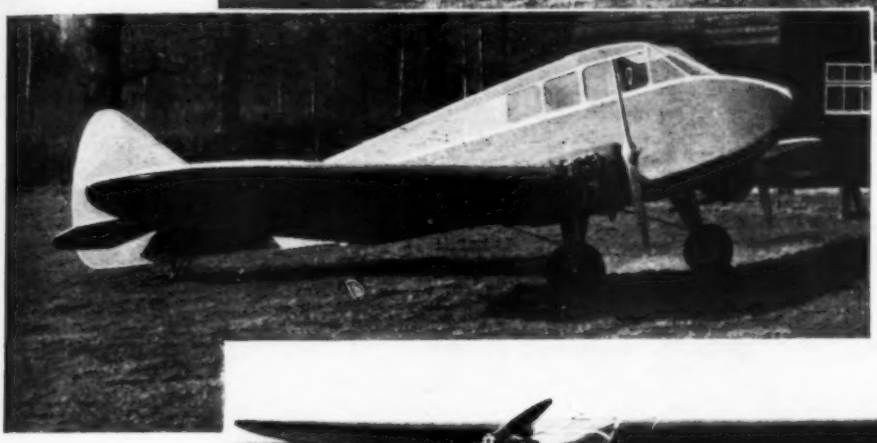
The specification of the Tiger Moth is as follows: Span, 29 ft. 4 in.; length, 23 ft. 11 in.; weight empty, 1,115 lb.; disposable load, 655 lb.; maximum speed, 109 m.p.h.; stalling speed, 45 m.p.h.; climb to 5,000 ft., 9 min.; range, 285 miles. Makers: De Havilland Aircraft Co., Hatfield, Herts.



For luxury ownership : The D.H. Dragonfly, aptly described as "an air liner in miniature," cruises at 127 m.p.h. for 885 miles with five occupants and their luggage. (*Flight* photograph.)

(Right) The latest Phoenix, which carries five people on 200 h.p. and has one of the quietest cabins of any single-engined machine.

(Below) The Hordern - Richmond Autoplane, which is expected shortly to be put into production.
(*Flight* photographs.)



(Below) By dint of clean design, the Hillson Praga has an excellent performance for a machine with a 40 h.p. engine. Production is now in full swing.
(*Flight* photograph.)

Heston

ALTHOUGH the Heston Phœnix has been designed largely for charter, feeder-line, and such work, its ability to carry five people on 200 h.p., its structural simplicity, and its cabin silence should appeal to the private owner who demands something rather larger than usual. All five occupants have the excellent view of the world at large which is so pleasant both from the passengers' and—particularly in bad weather—from the pilot's point of view. At cruising revolutions the occupants travel in an atmosphere of peace and quiet which must be almost unparalleled in the single-engined class. Cabin space is quite unobstructed, and the business of entering and leaving has none of the difficulties which are so often experienced in smaller aircraft.

The particular form of construction used is interesting, largely because of the fact that the rear portion of the fuselage is of monocoque construction and that the undercarriage retracts into a pair of stub wings from which the bracing struts run to the wing itself. The essential controls are centrally placed, so that with the swing-over control wheel the machine can be flown from either of the two front seats. The Dowty undercarriage, which is hydraulically operated, can, incidentally, be lowered in a matter of sixteen seconds. When the wheels are retracted the whole of the underside of the machine is left quite smooth, and this should be an advantage if, by any chance, an emergency landing has to be made on rough ground.

The specification of the Heston Phœnix is as follows: Span, 40 ft. 4 in.; length, 30 ft. 2 in.; weight empty, 2,000 lb.; disposable load, 1,300 lb.; maximum speed, 148 m.p.h.; cruising speed, 125 m.p.h.; landing speed, 55 m.p.h.; initial rate of climb, 650 ft./min.; cruising range, 500 miles; price, £1,980. Makers: Heston Aircraft Co., Ltd., Heston Airport, Hounslow, Middlesex.

Hillson

WITH the Hillson Praga now in production over here, we should see more of this interesting little lightweight, which carries two people in an enclosed side-by-side cabin at a maximum speed of 92 m.p.h. This performance, obtained on an engine of only 40 h.p., is the result of clean cantilever design, and the figure has been amply proved by the fact that in the second Isle of Man race last year the Praga averaged a figure just short of 90 m.p.h. over a triangular circuit. Mr. Brook's flight to the Cape also showed that the machine should stand up to hard use.

The Praga is easy to fly and has a very harmless stall, and the only difficulty which the newcomer might experience would be the result solely of the machine's cleanness, which gives it, unflapped as it is, a somewhat flat approach angle. However, the safe stall means that one can adjust the approach angle, as in the case of many other monoplane types, by the simple expedient of varying the air-speed to obtain either a sinking glide or otherwise. At present the machine is fitted with the Czechoslovakian Praga B engine, and a decision has not yet been reached concerning the unit which will eventually be installed.

In due course the company will probably take over the rights for the very interesting little twin-engined pusher monoplane which, it may be remembered, was exhibited for the first time at the Paris show.

The specification of the Hillson Praga is as follows: Span, 36 ft. 1 in.; length, 22 ft. 1 in.; weight empty, 584 lb.; disposable load, 445 lb.; maximum speed, 92 m.p.h.; cruising speed, 80 m.p.h.; stalling speed, 37 m.p.h.; climb to 1,000 ft., 3 min.; range, 300 miles; price, £435. Makers: F. Hills and Sons, Ltd., Trafford Park Road, Manchester, 17.

Hordern-Richmond

NOW that we know that the Hordern-Richmond twin-engined monoplane is likely to go into production at a very attractive figure, this machine has an added interest. The prototype was designed by Mr. Hordern, chief test pilot of the Heston Aircraft Co., to the re-

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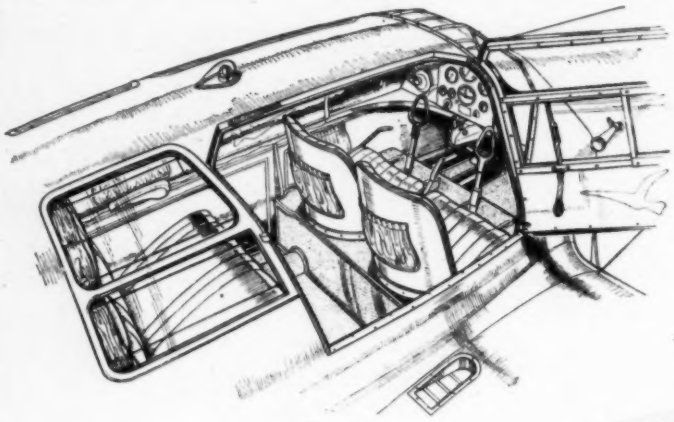
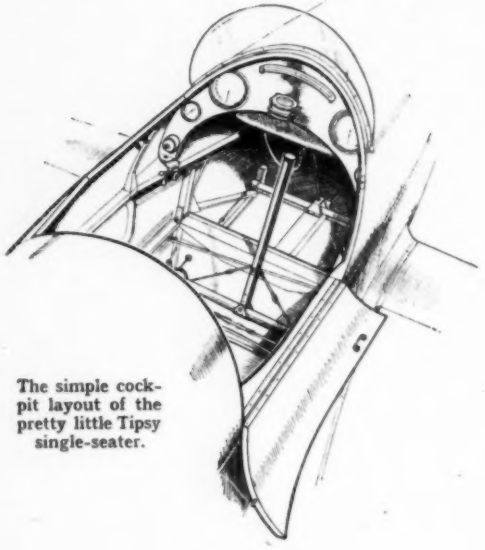
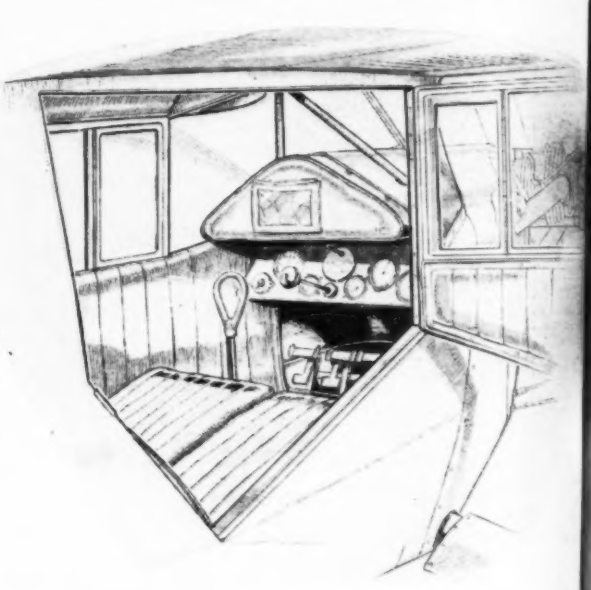


(Left) There is a genuine saloon car effect about the interior of the Percival Vega Gull.

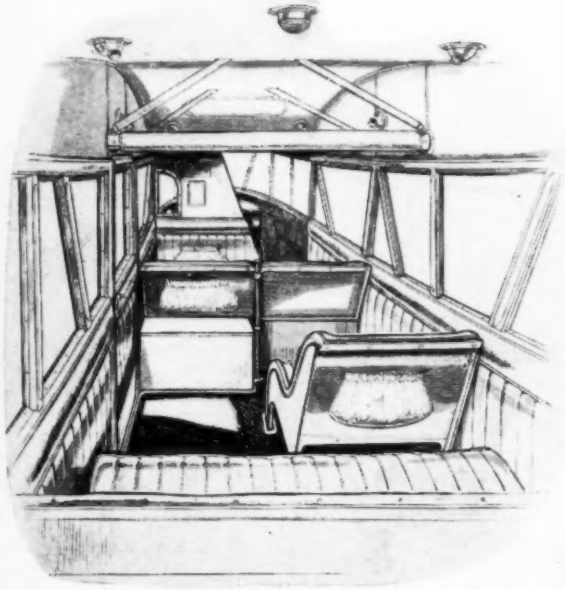
(Below) Popular for inexpensive dual instruction in comfort—the Aeronca.



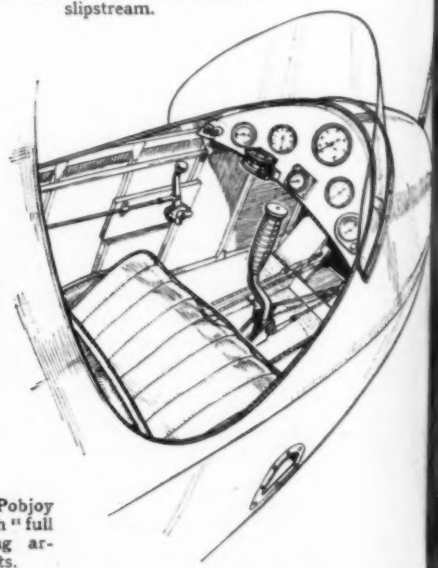
The simple cockpit layout of the pretty little Tipsy single-seater.



(Below) The Drone pilot has an excellent view and is free of airscrew slipstream.



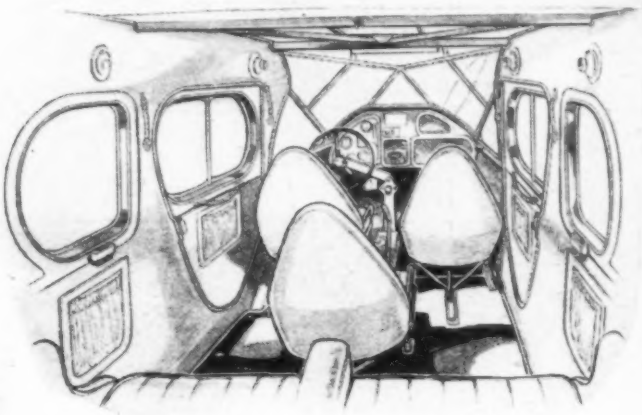
(Left) The Pobjoy Short Scion with "full house" seating arrangements.



NSIDE STORY

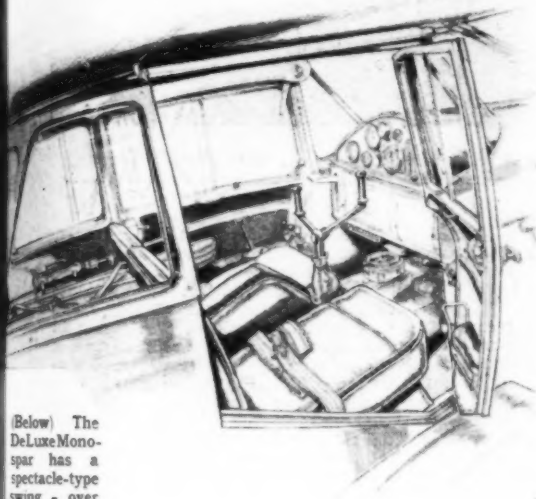
Elegance in Some Representative Types of Single-seater Simplicity to Five-seater Luxury

"Flight" Sketches

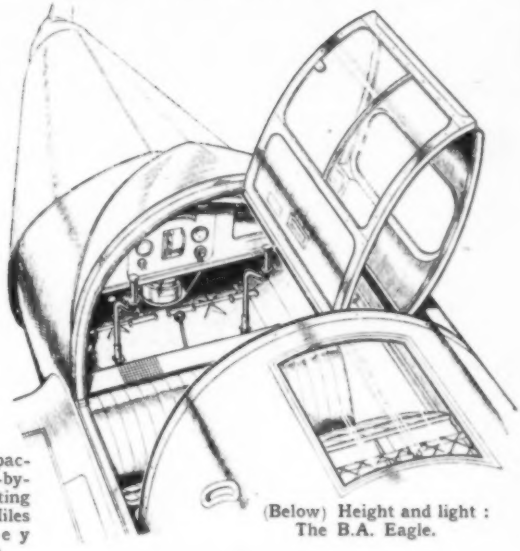


(Right) **Easy ingress and egress and an excellent view for the passengers are features of the Heston Phœnix.**

(Below) **A popular two-seater tourer and instructional machine, with plenty of luggage room and a joystick that doesn't get in the way—the D.H. Hornet.**

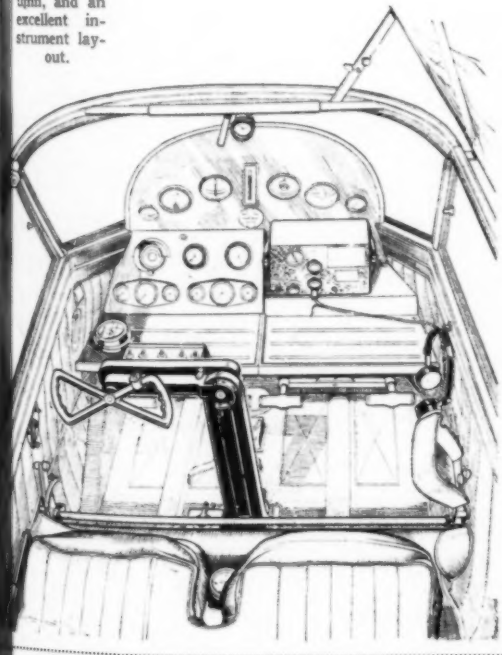


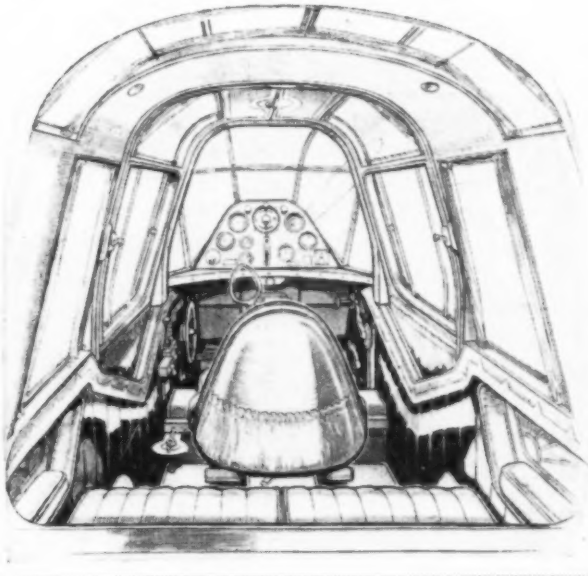
(Below) **The DeLuxe Monospar has a spectacle-type swing-over control column, and an excellent instrument layout.**

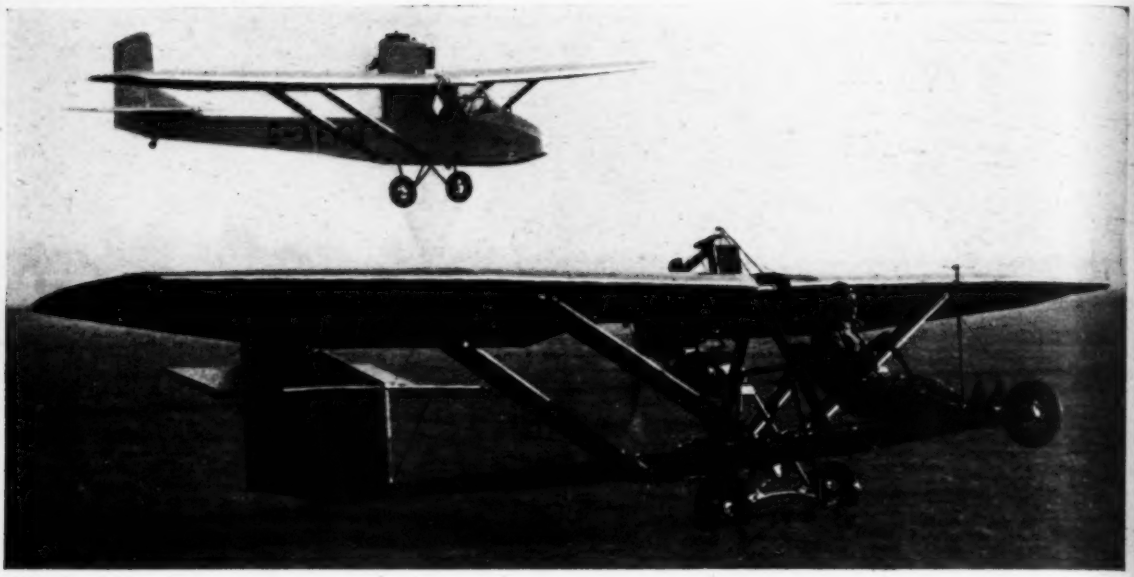


(Right) **Spacious side-by-side seating in the Miles Whitney Straight.**

(Below) **Height and light: The B.A. Eagle.**







A De Luxe Drone flying above a Flying Trainer, which, in this picture, is being handled by Mr. Kronfeld himself. The 1937 De Luxe model has been slightly modified in order to reduce the airscrew noise which has previously been the Drone's one drawback. (*Flight* photograph.)

quirements of the Duke of Richmond and Gordon, and the combination of a private owner's experience with that of a test pilot's would be expected to result in something interesting.

Reliability, easy flying characteristics, a good view, and ample room for the occupants were the main ideas behind the development of the Autoplane, as the machine is known. Certainly, it is one of the roomiest in the smaller class, and, in spite of the comparatively low power provided by the two Continental flat-fours fitted to the prototype, the take-off is quite remarkable and the climb well up to light aeroplane standard even when there are three people on board. This prototype is fitted with a new type of control system by which all manœuvres can be carried out with one hand. At the top of each of the normal control columns there is a small wheel which takes the place of the more usual rudder bar. Although there is no reason to suppose that production machines will necessarily incorporate this feature, the pilot is soon used to it.

No very definite performance figures can yet be given, but at 2,300 r.p.m. the machine appears to cruise at about 85 m.p.h., and the landing speed is about 40 m.p.h.

The address of the sponsors is Hordern-Richmond Autoplane, 12, Norfolk Crescent, London, W.2.

Kronfeld

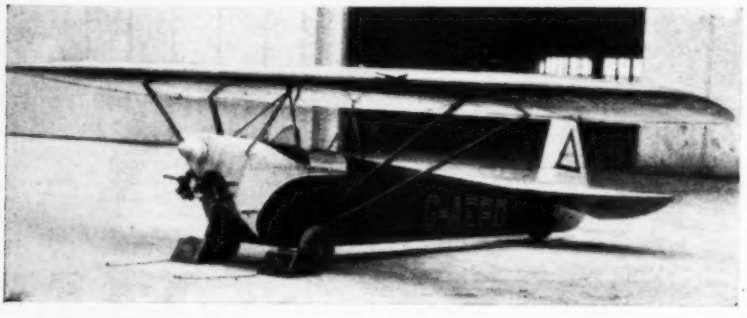
TO the Drone and its sponsors must go most of the credit for the more recent development of ultra-light machines in general. As originally produced in 1931 by the late Mr. Lowe-Wylde, the Drone was, in fact, little more than a two-seater glider fitted with a motor-cycle engine, but since that time it has been developed into a real flying machine of a very particular type and has become extremely popular—thirty-two of these machines have already been produced in this country alone. It was its sponsors, too, who first obtained a permit from the Air Ministry for such a machine.

The whole idea behind the Drone has been to produce a machine which, while flying on an economically low power, will be safe and exceptionally easy to fly and will provide the pilot with the good outlook and comfort inseparable from the pusher type. From the Super Drone, which had a more powerful engine, increased aileron area and folding wings, development has proceeded more recently to the De Luxe model, which has a four-cylinder water-cooled Carden-Ford.

This had an elevator trimming device, a split undercarriage and a steerable tail wheel, while the very latest model has been given a sweep-back, specially slotted ailerons to reduce control drag, and a stronger undercarriage. The reason for the slight sweep back was concerned, of course, with the matter of noise reduction; by this means it has been possible to place the engine farther aft, thus permitting the airscrew to run well away from the trailing edge.

In this connection the Ground Trainer, which is made in two forms, one for initial ground instruction and the other for straight flights, should be mentioned. One club in this country is already concentrating on training with this preliminary type.

The specification of the De Luxe Drone is as follows: Span, folded, 10 ft.; length, 27 ft. 10 in.; weight empty, 460 lb., disposable load, 260 lb.; maximum speed, 75 m.p.h.; cruising speed, 62 m.p.h.; stalling speed, 28 m.p.h.; initial rate of climb, 480 ft./min.; cruising range, 300 miles; price, £325. Makers: Kronfeld Ltd., London Air Park, Feltham, Middlesex.



Another lightweight single-seater—the Luton Minor. (*Flight* photograph.)

Luton

DESIGNED to meet the demand for a straightforward little aeroplane with a good all-round performance, the Luton Minor is a single-seater parasol monoplane in which the wing is partially plywood covered in order to remove the necessity for rigging adjustments. Capt. Latimer-Needham's idea has been to produce a machine which would virtually fly itself off the ground and be reasonably viceless in the air, and to this end various wing arrangements and so forth have been extensively tested. The engine fitted to the prototype Minor is an Anzani, but production machines will be fitted with Aero Engine Sprites.

The specification of the Luton Minor is as follows: Span, 25 ft.; length, 19½ ft.; weight empty, 380 lb.; disposable load, 220 lb.; maximum speed, 80 m.p.h.; cruising speed, 70 m.p.h.; landing speed, 30 m.p.h.; price, £192 10s.

One of the most interesting private owner's types to be introduced during the past year—the Miles Whitney Straight, a comfortable two-seat cabin monoplane on familiar Miles lines.

Since the original Luton Buzzard was described in *Flight* a second model has been developed as a result of the experience gained. It will be remembered that this machine is a high-efficiency low-wing cantilever monoplane with the engine mounted behind the pilot. The new model will have a fixed ply-covered tail plane, and a deeper undercarriage, the fuselage has been redesigned, and there is a detachable transparent covering to the cockpit. A variety of engines may be fitted, though the standard model will have a Sprite.

The specification of the Luton Buzzard II is as follows: Span, 25 ft.; length, 21¼ ft.; weight empty, 380 lb.; disposable load, 220 lb.; maximum speed, 85 m.p.h.; cruising speed, 70-75 m.p.h.; landing speed, 30 m.p.h.; initial rate of climb, 400 ft./min.; range, 220 miles; price, £320. Makers: Luton Aircraft, Ltd., Phœnix Works, Gerrard's Cross, Bucks.

Miles

AFTER a year or so of intensive development work, the long-awaited Miles Whitney Straight monoplane made its first public appearance at the beginning of this year and production is now in full swing. In many ways this machine is one of the most interesting full-sized light aeroplanes that have ever been made, and all the experience gathered by Mr. Miles in the course of his career is, so to speak, built into it. Furthermore, its sponsor, Mr. Whitney Straight, has been a private owner for many years, and he should have a very good idea of what is required.

The Miles Whitney Straight is a side-by-side seater low-wing cantilever monoplane, which is fast for its power, and yet it lands, with the pneumatically operated flaps down, at about 40 m.p.h. This landing is simplicity itself from the pilot's point of view, and, within reasonable limits, the machine's low-speed characteristics, again with the flaps down, could hardly be bettered. It is, in fact, possible to adjust one's angle of approach, when over-shooting, quite safely by flying the machine so slowly that the sink is very pronounced.

The undercarriage has been designed to take a maximum vertical velocity of 15 ft. per second. In cruising trim the Miles Whitney Straight can be flown on the stick alone and accurate steep turns can be made with one's feet placed firmly on the floor.

Particular attention has been paid to both internal and external finish, and adequate luggage space is provided on a vast area behind the seat backs.

For modern instruction : The Miles Hawk Trainer, a machine which is designed primarily for the training of Service pilots in modern technique.

The latest Monospar De Luxe, which, in standard form, is fully equipped for day, night and blind flying with four occupants and their luggage.

The specification of the Miles Whitney Straight is as follows: Span folded, 17.2 ft.; length, 25 ft.; weight empty, 1,250 lb.; disposable load, 750 lb.; maximum speed, 145 m.p.h.; cruising speed, 130 m.p.h.; landing speed, 38 m.p.h.; initial rate of climb, 850 ft./min.; range, 570 miles; price, £985. Distributors: Whitney Straight, Ltd., Brettenham House, Strand, London, W.C.2.

Developed from the Miles Hawk Major, which was the first machine in this country to be fitted with split trailing edge flaps, the Hawk Trainer is coming into its own now that the low-wing cantilever machine is popular for both civil and military work.

For more advanced training purposes the machine has been fully stressed for aerobatics, can be fitted with an inverted flying fuel system, and complete blind-flying instrument equipment is provided in each cockpit.

The specification of the Miles Hawk Trainer is as follows: Span folded, 13 ft. 10 in.; length, 24 ft.; weight empty, 1,240 lb.; disposable load (aerobatic), 585 lb.; maximum speed, 145 m.p.h.; cruising speed, 125 m.p.h.; landing speed, 45 m.p.h.; rate of climb, 1,200 ft./min.; range, 400 miles. Makers: Phillips and Powis Aircraft, Ltd., Woodley Aerodrome, Reading, Berks.

Monospar

AS the first private owner's type to be produced in standard form with complete day, night and blind-flying equipment, the Monospar S.T.25 has always been of especial interest to the owner who goes in for really serious touring and to the school which requires a twin-engined machine for training purposes. The latest De Luxe model has been improved on its predecessors in several important respects. Last year twin rudders were fitted in order to improve both the directional stability on full load and the controllability with one engine out of action. This year, new cowlings have been designed for the Pobjoy Niagara III engines, and the whole machine has been cleaned up, so that the maximum and cruising speeds are several miles an hour higher than they were previously.

As far as flying qualities are concerned, the S.T.25 leaves little to be desired, and a recent Martlesham report is almost extravagant—as these reports go—in its praise. Not so long ago a young woman who had done seventeen hours' flying in all completed a circuit in the machine without any difficulty. Although the Monospar has very definite flying characteristics of its own, these are very soon mastered, and the business of flying the machine for the first time is greatly simplified by the excellent field of view for the occupants of the front seats.

In its standard form the machine carries a pilot, three passengers and their luggage, but a fifth seat is immediately available for shorter day trips where luggage is not needed.

The specification of the De Luxe Monospar is as follows: Span folded, 14 ft. 10 in.; length, 26 ft. 4 in.; weight empty, 1,787 lb.; disposable load, 1,088 lb.; maximum speed, 132 m.p.h.; cruising speed, 120 m.p.h.; landing speed, 50 m.p.h.; rate of climb, 710 ft./min.; range, 415 miles; price £1,895. Makers: General Aircraft, Ltd., London Air Park, Feltham, Middlesex.

Percival

BY reason of its exceptional performances, both before and after the England-South Africa race, the Vega Gull has now proved itself as a high-speed touring machine for the private

An impressive flying picture of the standard Percival Vega Gull, which carries four people and their luggage at 150 m.p.h.

owner. Briefly, it is a scaled-up version of the original Gull Six, and carries four people in considerable comfort at a cruising speed of 150 m.p.h. Nowadays the Vega Gull may be supplied with a v.p. airscrew, with which, of course, both the cruising speed and the payload have gone up. Full dual control is provided in the standard machine, there is a large locker for baggage (accessible from the outside) behind the two rear seats, and fresh air is fed to the cabin from a wing aperture placed well outboard and out of the way of any possible engine fumes. Manually operated flaps are, of course, fitted.

Experienced amateurs who are interested in racing, and who like to go very quickly from place to place, will be interested in the Mew Gull, which is a high-speed single-seater on familiar Percival lines. In its latest form with a variable-pitch airscrew this machine cruises at something like 220 m.p.h. for 860 miles with a total payload of nearly 500 lb.

A twin-engined Percival machine should be making its appearance in the not-too-distant future.

The specification of the standard Vega Gull is as follows: Span, 39 ft. 6 in.; length, 25 ft. 6 in.; weight empty, 1,575 lb.; disposable load, 1,175 lb.; maximum speed, 170 m.p.h.; cruising speed, 150 m.p.h.; landing speed, 45 m.p.h.; range, 620 miles; price £1,550. Makers: Percival Aircraft Co., Ltd., 20, Grosvenor Place, London, S.W.1.

Economical performance and easy handling qualities are the main features of the Pobjoy Scion.

Pobjoy

DESPITE its economical performance in carrying a disposable load of 1,000 lb. at a cruising speed of 115 m.p.h. on two Pobjoy Niagara III engines, the Pobjoy Short Scion has hardly received the attention which it deserves. Originally designed by Short Brothers and now handled by Pobjoy Airmotors, the Scion, which is a high-wing cantilever monoplane, has been successfully fitted out both in landplane and seaplane form. The cabin is arranged to seat five passengers in addition to the pilot, but an additional hinge seat can be fitted for shorter journeys, and the interior arrangements can, of course, be modified to suit the needs of any owner who requires a luxurious twin-engined machine for any particular purpose.

Although the pilot is seated by himself in the nose and no dual instruction is possible, the machine is very easy to handle and has very pleasant controls. From the maintenance point of view the construction is simple, and the controls and so forth can easily be reached for inspection purposes. The whole machine is built of metal, the fuselage being of welded steel tubing and the wings of duralumin. Experience has shown that over a long period of time the Scion is inexpensive in the matter of maintenance.

The specification of the Pobjoy Scion is as follows: Span, 42 ft.; length, 31 ft. 6 in.; weight empty, 1,920 lb.; disposable load, 1,280 lb.; maximum speed, 130 m.p.h.; cruising speed, 115 m.p.h.; landing speed, 50 m.p.h.; rate of climb, 625 ft./min.; range, 400 miles. Makers: Pobjoy Airmotors and Aircraft, Ltd., Rochester, Kent.

Tipsy

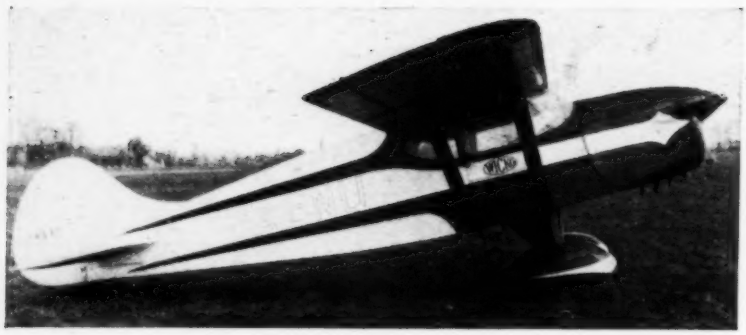
NOW that production of the Tipsy monoplane has been started in this country we should see more of this very interesting little ultra-lightweight. Designed by Mr. E. O. Tips, of the Belgian Fairey company, the machine has the moral backing of a big aircraft manufacturing concern, and can, therefore, from the constructional point of view, be trusted implicitly. It is being made over here by Aero Engines, Ltd., of Bristol.

In its latest form the Tipsy is fitted with an Aero Engine Sprite with dual ignition, and some slight changes have consequently been made to the cowling since the Tipsy made its first appearance in this country. As a flying machine the Tipsy is pure delight; all three controls are most effective and extremely light, and the machine may reasonably be described as the only aerobatic ultra-lightweight on the market. From the point of view of the more serious tourist, there is a fair amount of luggage space, and the machine has the extremely useful range of 450-odd miles. For the benefit of the majority of pilots who do not always make perfect landings later machines have been fitted with a sprung undercarriage.

As long ago as June, 1935, the Tipsy put up a very good performance at the Keiwit-Hasselt Meeting, consuming little more than a gallon of fuel an hour at an average speed of 63 m.p.h., and also coming to a standstill only 90 yards from a rope which had been stretched at a height of 6½ ft. from the ground.

The specification of the Tipsy is as follows: Span, 24 ft. 7 in.; length, 18 ft. 8 in.; weight empty, 286 lb.; disposable load, 264 lb.; maximum speed, 95 m.p.h.; cruising speed, 80 m.p.h.; landing speed, 37 m.p.h.; climb to 1,000 ft., 2 min. 25 sec.; range, 470 miles; price, £265. Enquiries to M. C. Macpherson, Tipsy Aircraft, North Hyde Road, Hayes, Middlesex. Main distributors: Brian Allen Aviation, Ltd., Airport of London, Croydon, Surrey.

The latest Tipsy monoplane, which is powered with a dual-ignition Sprite engine and has a range of 470 miles at a cruising speed of 80 m.p.h. or more.



In its latest form the Wicko monoplane is fitted with a Cirrus Minor engine and trailing-edge flaps.

Wicko

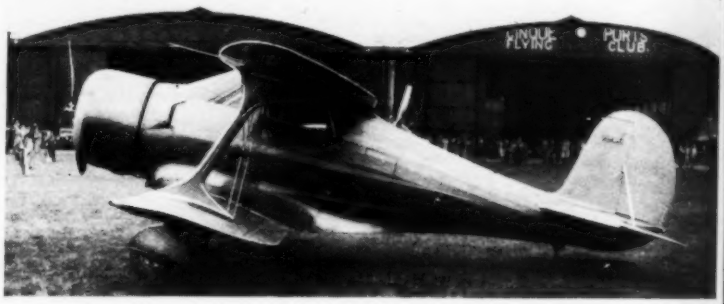
SINCE the original Wicko monoplane was built and flown with a converted Ford V.8 engine, one or two minor changes have been made to the machine, which was designed primarily in an attempt to provide cabin comfort for two people with a useful cruising speed at a comparatively low price. The latest model is fitted with flaps, and a batch of six of these machines, each fitted with a Cirrus Minor engine, is going through at the manufacturers' new works at Southampton's municipal airport.

The construction of the whole machine has been made as simple as possible, the wings having two wooden spars and the fuselage being a square plywood box. With the Ford engine the machine came up to expectation in all matters save that of take-off run, and, when the first batch of six Minor-engined machines has been put through, development will be continued on the Ford-engined version with slightly increased wing area and dual ignition.

The specification of the Wicko with Cirrus Minor engine is as follows: Span, 31 ft. 6 in.; length, 23 ft. 3 in.; weight empty, 938 lb.; disposable load, 562 lb.; maximum speed, 120 m.p.h.; cruising speed, 105 m.p.h.; landing speed, 40 m.p.h.; range, 450 miles; price, £650. Makers: Foster Wikner Aircraft Co., Ltd., Southampton Municipal Airport, Eastleigh, Southampton.

WELCOME INVADERS

A Selection of Popular American Machines on the British Market : Lightweights and De Luxe Tourers



A fast American tourer which is available in this country—the Beechcraft C.17.R which cruises, with four occupants, at 202 m.p.h. Some other American makes with concessionaires in this country are illustrated on p. 268d. (*Flight* photograph.)

ONE repercussion of the Air Ministry's Expansion Programme is the omission of British manufacturers to fill certain gaps in the desired range of civil aircraft, notably in the private-owner category. This has led a number of enterprising concerns to secure agencies for several types of American aircraft which exhibit some excellent characteristics and, despite import duties, offer some serious competition to certain British types in production at the moment.

These interesting newcomers from over the herring pond are dealt with hereafter under the headings of their concessionaires in this country.

Surrey Flying Services, Ltd.

THE Porterfield 70, Cessna C.37, Fleetwings Sea Bird and the various Beechcraft models are offered by S.F.S.

A sturdy two-seater monoplane, the Porterfield 70 (illustrated on p. 268d) mounts the neat little 70 h.p. Le Blond radial and has two tandem seats in its cabin together with full dual controls. Using a fraction over four gallons an hour the Le Blond takes the Porterfield along at a happy 100-105 m.p.h. cruising gait. The "70" touches down at a gentle 40 m.p.h., and selling as it does at £635 (navigation lights ten guineas extra) is a most fetching little vehicle.

Next in price-range comes the Cessna, the latest C.37 version of which, while still using the 145 h.p. Warner Super Scarab radial, is more comfortable and five inches wider than its predecessor. Additional standardised refinements include self-starter and generator, electrically operated flaps, Kollsman instruments, softer undercarriage, ball bearing controls and navigation lights. Four persons and baggage are carried at a consistent 143 m.p.h. on less than 7½ gallons an hour.

The Cessna C.37 sells for £1,495 ex-Croydon. A metal airscrew and float undercarriage are now available. A photograph of the Cessna appears on p. 268d.

A third S.F.S. "line," the Fleetwings Sea Bird amphibian is notable for its stainless steel shot-welded construction. It carries four at a comfortable 135 m.p.h. cruising speed with the 285 h.p. Jacobs L.5 and, flapped, lands at 47 m.p.h. The price is expected to be around £5,000.

A large number of fortunate private owners have lately acquired examples of the single-engined Beechcraft, as illustrated above. These fascinating back-staggered high-performance biplanes continue with 225 h.p., 285 h.p. Jacobs, or 420 h.p. Wright engines. With one of the last-named power plants Mr. Charles Gardner recently flew under normal conditions from Croydon to Paris in 1 hr. 2 min. This model (C.17R.) cruises at 202 m.p.h., costs £3,670 (the range commences at £2,050) and like the rest of its family has self-starter, generator, flaps and retractable undercarriage. An announcement concerning an even faster Beechcraft biplane is expected shortly.

Brian Allen Aviation, Ltd.

TO summarise the claims of the concessionaires, whose business is centred at Croydon, the 1937 version of the ubiquitous Stinson Reliant cruises a little faster and lands a little slower than its forerunner, and exhibits considerably nicer action on the glide. The cabin (see photograph on p. 268d) is rather more roomy and ventilation and sound-proofing are very strong points. Outlook, cowling and accessibility are all improved. Which means, to those who knew last year's Reliant, that the new machine is something "super."

Basically a high-wing, strut-braced four-seater with fixed single-strut undercarriage and flaps, the 1937 Reliant can be supplied with the 245 h.p. Lycoming (65-73 octane), 260 h.p. high compression Lycoming (80 octane), 285 h.p. Wright R-760-E1 (73 octane), or 320 h.p. Wright R-760-E2 (80 octane). A v.p. airscrew is standard. Cruising speeds range from 143 m.p.h. to 161 m.p.h., and disposable loads from 1,243 lb. to 1,454 lb.

A. J. Walter

THE outstanding popularity of the Taylor Cub tandem-two-seater high-wing strut-braced monoplane re-

sulted last year in an increase of three times the sales made in America during the previous year.

Of mixed construction the Cub mounts a 40 h.p. Continental A-40-3 four-cylinder engine which gives it a cruising speed of 75 m.p.h. and a take-off run of 125 ft. The open version of the Cub sells from £452 10s., and the closed model from £560.

Tare and gross weights are respectively 563 lb. and 970 lb., which denotes high structural efficiency. A photograph appears on p. 268d. The address of Mr. A. J. Walter is Tollerton Airport, Nottingham.

Prospective buyers of foreign aircraft and engines are naturally somewhat hesitant before making their purchase until they are guaranteed good service and an adequate supply of spares.

American Aircraft and Engine Service, Ltd., of Croydon Airport, has been formed to meet the requirements of operators of all types of American aircraft. Officially representing the Wright and Lycoming engine companies in the British Isles, the concern are also stockists for Warner and Le Blond.

A successful German type, the Messerschmitt Typhoon, is to be fitted with a Gipsy Six and handled here by A.F.N., Ltd., of Falcon Works, London Road, Isleworth.

The Typhoon is a low-wing cantilever monoplane capable of speeds approaching 200 m.p.h. A demonstrator will be over shortly.

The New Marendaz

STRESSED-SKIN construction, a retractable undercarriage, flaps and slots appear in the specification of a new type of low-wing monoplane, of 2-3-seater capacity, which is being produced by International Aircraft of Maidenhead. The chief designer of the company is Mr. D. M. K. Marendaz, and the chief draughtsman is Mr. C. F. Allen, late of Faireys and Westlands. Prices will range from £1,500 to £2,000, and the machines will be powered by units such as the Gipsy Six, the Renault Bengali, or any radial of equivalent horse-power.

The Tipsy in the North

WARDS OF WALLASEY, the well-known Cheshire motor agents, have taken over the distribution of the Tipsy monoplane in the North of England. Their headquarters are at 3-13, Leasowe Road, Wallasey.

King's Cup Air Race, 1937

THE Royal Aero Club announces that the King's Cup Air Race will take place on the 10th and 11th September. The first day will be an Eliminating Contest over a course of approximately 800 miles from Hatfield and going North to Newcastle-on-Tyne and then on to Aberdeen. From Aberdeen the course will be to Northern Ireland (Newtownards) via Glasgow. The last leg of the course will be to the Irish Free State, with the final control point at Phœnix Park, Dublin. The competitors will remain the night at Dublin.

For the purposes of elimination the competitors will be divided into two classes, those with aircraft fitted with engines up to 150 h.p. and those over 150 h.p. Two-thirds of the starters in each class who complete the eliminating course in the fastest time will qualify to fly in the final course the following day. There will be no handicap in the Eliminating Contest.

For the final course the competitors will leave Phœnix Park, Dublin, at 11.30 a.m., on Saturday, September 11th, and fly to Northern Ireland (Newtownards) and then across the southern part of Scotland to Blackpool. The final control will be at Cardiff and from there a direct flight to Hatfield, the finishing point. The total distance of the final course is 660 miles.

At each of the control points the competitors will be required to make a compulsory stop of 30 minutes. Apart from the controls the following towns will be used as turning points:—Cambridge, Skegness, York, Scarborough, Whitby, Edinburgh, Portpatrick, Carlisle, Stoke-on-Trent, Leicester.

In the final course, starting from Dublin, the competitors will be sent away in accordance with their handicap allowances and the competitor who first reaches Hatfield will be the winner of the Coronation Year King's Cup Air Race.

In addition to the King's Cup presented by his Majesty King George VI, the winner will receive a prize of £1,000 presented by Viscount Wakefield. Other prizes also presented by Viscount Wakefield will be £350 to the second and £150 to the third, and two special prizes of £250 each to the competitor in each class who completes the eliminating course in the fastest time.

Empire Air Day

IT is now possible to list the Royal Air Force stations, fifty-six in number, which will be open to the public on Empire Air Day, May 29. They are as follows:—

Abbotsinch.	Gosport.	North Weald.
Abingdon.	Grantham.	Odiham.
Aldergrove.	Halton.	Old Sarum.
Andover.	Hawkinge.	Pembroke Dock.
Biggin Hill.	Henlow.	Peterborough.
Bircham Newton.	Hornchurch.	Scampton.
Calshot.	Hucknall.	Sealand.
Castle Bromwich.	Kenley.	Sutton Bridge.
Catfoss.	Lee-on-the-Solent.	Tangmere.
Catterick.	Leuchars.	Tern Hill.
Cranwell.	Lympne.	Thornaby.
Donibristle.	Manston.	Turnhouse.
Driffield.	Martlesham Heath.	Upavon.
Duxford.	Mildenhall.	Upper Heyford.
Eastchurch.	Montrose.	Upwood.
Farnborough.	Mount Batten.	Usworth.
Felixstowe.	North Coates Fitties.	Waddington.
Filton.	Northolt.	West Freugh.
Finningley.	Odiham.	Worthy Down.

By permission of the firms operating them, the following civil training schools will also be open: Hamble (A.S.T., Ltd.), Perth (Airwork), Sywell (Brooklands Aviation), Hatfield and White Waltham (D.H.), Brough (North Sea Aerial and General Transport Co., Ltd.), Desford (Reid and Sigrist).

THE MERLIN'S PERCH

A close-up of the installation of the ethylene-glycol-cooled Rolls-Royce Merlin in the Hawker light bomber, revealing also the radiator intake and outlet, bomb traps and details of the Dowty retractable undercarriage with its toed-out Dunlop wheels. It will be noted that the new Rolls-Royce exhaust system, which does a certain amount of flame damping and silencing, is fitted. This offers considerably less resistance than the "ramshorns" used on several Kestrel-engined service types.

(*Flight* photograph.)

ROTATING-WING AIRCRAFT

Another Aspect of the Potential Private-owner Market : Four Experimental Types Reviewed

ENCOURAGED by the work of the late Señor de la Cierva, several designers have turned their attention to development along slightly different lines, taking the Autogiro (dealt with on p. 253) as their starting point, so to speak. Four of these have progressed to the point of having experimental machines flying, although none can be said to have reached the production stage. These four are the Weir jump-start Autogiro, the Kay Gyroplane, the Hafner A.R.III, and the Nagler Helicogyro.

Two of these experimental rotating-wing types may be said to be built on similar basic principles in that they make use of an incidence control for individual rotor blades. The particular mechanism adopted is, however, different in the two types. In the Kay Gyroplane, described and illustrated in *Flight* of December 27, 1934, use is made of so-called "Z" cranks for controlling incidence, while in the Hafner (see *Flight* of February 18, 1937) a central "spider" is linked by bent cranks to the blade roots. In the Kay the rotor head is tilted sideways for lateral control, fore-and-aft control being by ordinary elevator. In the Hafner there are two rotor head controls, one for lateral and one for longitudinal tilting; these are additional to the incidence control of individual blades.

The Weir Autogiro (*Flight*, July 23, 1936) is, of course, based entirely on Cierva principles and incorporates the new "autodynamic" rotor head. By speeding-up the rotor before the start, and then suddenly releasing the drive and increasing the blade incidence, the energy stored in the rotor, which acts as a powerful flywheel, is used for lifting the machine straight into the air without forward run along the ground.

The Nagler Helicogyro is entirely new to this country, and *Flight* is pleased to be first with a picture of this machine. It has a single two-bladed rotor, and can be flown either as a helicopter or as an Autogiro. The torque reaction from the rotor is overcome in a very ingenious way, and the machine has made hovering flights of ten minutes' duration over a field a few miles from London. An interesting feature of the design is that the engine drives a "pusher" airscrew, the pilot having a perfect view from the cockpit. More than that it is not permissible to say at the moment.

The new Nagler Helicogyro can be flown either as a helicopter or as a machine with windmilling rotor.

The Weir Jump-start autogiro (left) leaps straight off the the ground. It is fitted with a Weir engine of 45 h.p.

The Kay Gyroplane (below) has a four-bladed rotor with incidence control.

The Hafner A.R.III Gyropiane has a Pobjoy engine of 90 h.p

Flight Photographs.

THE CLUB INSTRUCTOR'S DAY

Some Solemn Thoughts—which Probably Point Several Morals

By GEORGE F. YUILL

"CONTACSIR?" . . . *Deep silence.* "Contacsir?" . . . *Profound silence.* "Switchesoffsir" . . . "Oh-er-what? Switches on?" "No, sir, *OFF*." "They *were* off —."

"Well, they're not now." Thus the instructor, adding a third side to this illuminating conversation. When he has gently explained to the pupil just Who Should Say What, and To Whom, his day's work has started. In summer it will not really end until contact of head and pillow are ultimately established.

What a day it is! At many civil flying clubs it extends from 10 a.m. till after 10 p.m. at the height of the season, and thereafter the instructor is lucky if he can elude the hospitality of the more enthusiastic, who depart only when the shutters are put up at midnight. All day long members come and go, some to fly, some to watch, some to refresh themselves, and many to tell any convenient victim how they battled with the forces of nature on their last cross-country flight of forty miles.

Some spend the morning, some the afternoon, and some the evening, and all expect and like to see the chief instructor "doing his stuff" in the cheery old familiar way, no matter when they arrive. To them he is part of the equipment of the place, to be used when required, to be pointed out to friends, to be introduced with a certain pride, to be recipient of their everlasting tales of daring, to be slapped on the back. "Good old Bill, that's him at his crazy flying." "Wotcher, Bill, have a drink?" "Hi, Bill, what's the course to Blackpool?" "And, do you know, Bill, I pulled the stick back and, believe it or not, the tree passed." Actually, Bill's intent expression is a very false indication of his interest in the tree episode, which he had heard a dozen times. It is a mask developed in self-defence. His mind is really deeply concerned with the relative progress of a wide formation of two of his precious aircraft returning from the east and a nasty-looking line-squall arriving from the north-west.

The Hopeless One

"Can you give me half an hour's landings now, Bill?" An external smile, an inward groan—it is the season's blackest sheep. "All right, come along and do your best." (One thing about that approaching storm—it will stop this boredom early, even if it wrecks half the fleet.) The circuit takes about four minutes, the approach and landing one minute, and the garrulous pupil, who has undoubtedly passed the age when learning anything is possible, takes three minutes to explain why that was a bad effort. After the next attempt he unfolds a new scheme of instruction to the instructor, which takes five minutes, and Bill thinks that if the progress is necessarily slow the saving in engines is quite outstanding. What do a few minutes here or there matter, anyway? This is Blacksheep's twentieth hour, second instructor, and one hundred and fiftieth landing. (Before he finished he removed to yet another school and instructor, did yet another spell of concentrated landings, and then returned with an "A" licence and a pile-up to his credit.)

By the end of the day Bill's head is buzzing with a hundred vivid memories, the imprint of a score of personalities marks his mind, and the anxiety of fifty flights by forty different people is just beginning to slip from his shoulders. For every flight in a club aeroplane by any member is his responsibility, no matter where or what the standing of the member. At the end of the year his work is judged by the freedom from accidents of his school, the number of new pilots trained and the number of hours flown.

Positively no connection with the (almost) entirely fictitious characters in Mr. Yuill's article, but an appropriate decoration nevertheless—Capt. V. H. Baker, erstwhile Heston chief instructor, being firm with a pupil, the Earl of Jersey.

But the big black marks come from crashes, and they simply *must not occur*. This keeping control of other people's flying to make it safe is the most difficult part of the instructor's flying duties, and calls for the greatest discernment of character and exercise of tact, as well as a quick appreciation of the relative merits of the known skill of each member in relation to the proposed flight and the likely weather. It is noticeable that mishaps which occur are practically never among the very inexperienced, or even the moderately trained, but among the pilot members who are beginning to resent the instructor's careful supervision of their outings. They are the ones who get lost in fog, bewildered in rain or tied in knots with low cloud, railway tunnels and high trees. Of course, they know better than to follow instructions to telephone for advice about the return flight, or to have a friendly tip from the instructor of the aerodrome visited. The sad thing about it is that usually only the aeroplane suffers, and the stupid one returns to the club with just a black eye, and very soon has placed himself on a niche alongside the other "heroes" of aviation. The instructor notes sadly that, as usual, the accident has happened to the machine which has just completed its annual overhaul and emerged fresh and trim from the works, and just at the beginning of the busiest month of the year.

Teaching flying is, of course, part of Instructor Bill's duties, but he knows that part of his work so well—he's been doing it since the war—that it presents no problems, of an exhausting nature to him. "Shove it in the cockpit," he has been heard to say in an unguardedly frank moment, "and I'll teach it to fly in eight hours plus forty minutes for each year of age over twenty-five." This is a generalisation to which he remembers some painful exceptions, e.g., Little Annie Rooney from Chorlton-cum-Medlock, who was ageless, like the Sphinx, with a similar brain, and a nearness of fuselage to deck which was only ultimately compensated for by her impressive arrival in sturdy clogs. But it indicates his familiarity with the job. Simple citizens are his raw material, sound, if inexperienced pilots his finished product.

They are largely invisible behind him in the rear cockpit of his D'Avroland Sloth, and vary only in their aptitude to assimilate new ideas and the smell they produce. Ladies, for example, perfume the swirling eddies which cool his neck and back with *Nuits de Paris*, and a certain type of youth taints the breeze with a distinctive oil of violets. Occasionally there emerges from the deadweight in the back a Personality, and this wakens him up and disturbs his air-borne repose, such as the discerning lady who asked him in perfumed tones—via the speaking tube after three hours' dual: "Now do tell me which is the horizon thing

you sometimes mention"! Or the realist who, in the course of forced landing practice, switched off the rear switches without comment, proceeded to overshoot the selected field by a great deal and then left Bill to grapple with a looming farmhouse and a dead engine.

But his Big Task is the Committee and its activities. In most of the light aeroplane clubs the management is in the hands of democratically elected bodies called the general committee, which meets in solemn conclave once a month behind closed doors to direct this organisation which has been entrusted to them. Their qualifications at the best are a proud war record or a genial personality, and they vary between that and unbounded ignorance of the problems which beset a flying school. They are the equivalent of company directors—all the ten or twelve of them—and the company which requires their combined brains has a capital of perhaps £5,000! They understand Bill's limitations, weaknesses and temptations and labour to produce rules which will circumvent them. But, still better, they understand one another's subtle propaganda for their own futile and brainless pet schemes—the new bright-red American bar; the painting of one of the Sloths yellow and black for first soloists; the reduction of Bill's pay; the acquisition of a twin-engined bomber; the sacking of the steward; the doubling of Bill's flying pay, and so on. Woe betide Bill if, in an unguarded moment, one of the red bar group catches him listening appreciatively to the wholesale fishmonger's formidable scheme. He must steer a painful and difficult neutral course between the warring sections, being neither discouraging because they mean well, nor enthusiastic because their plans are potty. Unfortunately, sitting on the fence is often interpreted as hostility, and a later invitation to remain after hours has to be accepted to mollify the hurt feelings while the whole affair is drowned in beer.

It seldom occurs to the committees of the clubs to make their Bill a manager and let him stand or fall by his results, as, in fact, they do in their own businesses. After all, they are *The Committee*, which means, in effect, *The Club*, and they cannot let a mere pilot aspire to such responsibility. Besides, there is a certain amount of local publicity attached to their office which is not unacceptable to the wholesale fish business, or to the aspiring barrister. "Captain Robinhood, in an interview with our special representative to-day, stated that aviation had a great future," looks very pleasing in the local Press, and someone may remember the Captain when they wish professional advice.

The best feature of Bill's day is the contact with many who become sincere friends—men and women from many and varied walks of life who each bring their quota of interest and occupation, and a genuine appreciation of his work and difficulties. That he becomes at first their embarrassed but understanding hero is just part of his job, and he knows from experience that this phase will probably ripen into the true friendship which springs from joint effort and a common ideal, the advancement of the club's prestige in the world of flying.

Sleepily ruminating on these and endless other ideas, with the non-controversial pillow his head at last makes a grateful—Contact!

Death of Christopher Sprigg

IT was with feelings of deep regret that the British aviation world learned last week of the death in Spain of Christopher St. John Sprigg. Many did not even know that he had gone to Spain to fight on the side of the Spanish Government. Christopher Sprigg did not go there in a spirit of adventure. He dreaded and detested war above all things, but he felt that only by taking an active part in the Spanish struggle could he serve the cause of freedom which he had so deeply at heart. He saw the Spanish war as something far greater than a national conflict, as a struggle upon the outcome of which depended the whole future and safety of civilisation in Europe.

Christopher Sprigg arrived in Spain early in December and joined a British battalion of the International Brigade. He went into action for the first time on February 12, and was killed on March 5 beside the machine gun with which he and another had volunteered to remain in order to cover the withdrawal of their company, which had been caught by an enfilading fire.

With his only brother, T. Stanhope Sprigg, Christopher Sprigg was joint founder of *Aeronautical Engineering*, and he had been a director of Airways Publications, Ltd., and of Aeromarine Advertising, Ltd. At the time of his death he was a director of Godbolds, Ltd. His death cuts short a very promising journalistic and literary career, his books having covered not only aeronautical subjects, but fiction as well. His latest book, *Let's Learn to Fly*, was published this month, and before he left for Spain he had corrected the proofs of what may come to be regarded as his greatest work, a book to be published by Macmillan shortly under the title, *Illusion and Reality*. This is a history of poetry through the ages, bound up with a survey of man's constant struggle to be free.

Home Production in Sweden

THERE are four aircraft manufacturing firms now in existence in Sweden, all of which are concerned with the construction of private aeroplanes. The Flygförvaltningen (Swedish Air Force) recently undertook the work of investigating the possibility of letting the existing home industry build at least part of the fleet of 165 new machines which are to be acquired during a period ending July 1, 1943.

In a report of these investigations the Flygförvaltningen advocate that the task of building light bombers should be given to the aircraft department of the State Railways Engineering Shops, and the latter, in collaboration with the Nohab Flygmaskinsfabriker, propose to float a new aircraft company, A/B Förenade Flygverkstäder, to erect a modern factory at Trollhättan for an output of bombers and fighting aircraft.

Fifty Years of Oils

STERNOL, LTD., who supply a special oil or compound for practically every industrial and engineering process, this year celebrate their fiftieth year of establishment.

Engineering Data

THE MECHANICAL WORLD YEAR BOOK for 1937 is obtainable from Emmott and Co., Ltd., of 28, Bedford Street, Strand, London, W.C.2. The price is 1s. 6d., and the book contains calendar, diary, regulations, equivalents, metric and conversion tables, and mechanical specifications.

Vickers Chairman to Retire

GEN. SIR HERBERT A. LAWRENCE, it is announced, has expressed his desire to be relieved of his duties as chairman of Vickers, Ltd., from the conclusion of the annual general meeting. He will retain his seat on the board for the time being.

Mr. A. A. Jamieson, who has been a member of the board for over eight years, will succeed Sir Herbert Lawrence as chairman of the company.

Cabin Windows

IN every branch of modern transport Young sliding windows have been widely used for many years. The D-type constant-balance ("stay-put") window is very suitable for aircraft work, due to its lightness, simplicity, and the ease with which a breakage may be replaced. The patented balance system has a compensation arrangement giving extra pressure at the shut position so that no lock is necessary; a simple burglar-proof lock, however, can be supplied. The complete D.I. model weighs approximately 1¾ lb.

The makers are Young Windows, Claydon Works, Wishaw, Scotland.

Publishers' Announcement
EASTER HOLIDAYS

Miscellaneous Advertisements intended for the issue of March 25 must be in our hands by first post on Monday, March 22.

This issue will be on sale one day earlier than usual, i.e., Wednesday, March 24.

SAILPLANE versus AEROPLANE

Which Requires the Greater Skill to Fly?

A Rhönadler at Dunstable: In spite of the absence of fixed tail-plane, the very small fixed fin and the highly tapered wing, this machine is remarkably stable. It is easy to fly safely, but very difficult to fly well enough to achieve the performance of which it is capable.

(Enlargement from the film "Prelude to Flight")

By BELLEROPHON

A FEW weeks ago "Indicator" was discussing in *Flight* the flying of ultra-light machines, and observed of one specimen that the approach and landing required "semi-sailplane experience which can only be acquired with practice."

Passing over for a moment the question of what strange hybrid a semi-sailplane is, this remark must be almost the first to appear in the more solid aviation papers acknowledging that sailplane experience might be valuable in something other than sailplaning. So I am all the more grateful to *Flight* for allowing me space to enlarge on this topic.

As this article is bound to be based largely on personal experience, I ask to be excused for saying what that experience has been. I learnt to fly, on Mark I Cirrus Moths, in 1928, and by 1932 had done a mere 70 hours—on ordinary light aeroplanes with an hour's excursion into the somewhat terrifying realms of the Comper Swift. I packed up power flying (which to me appealed only as a pure sport) and started gliding in 1933. To date I have done about 45 hours in a variety of sailplanes of all sizes and types.

I have not flown a power 'plane since 1932 (except for twenty minutes' dual in 1935), yet I am absolutely certain that *sailplane experience has made me a far safer and better pilot all round than I was four years ago.*

The reason, without any doubt, is that advanced sailplane flying requires a far higher degree of accuracy in the air than anything except advanced C.F.S.-style aerobatics and formation flying with power craft.

Consider such a sailplane as the Rhönadler—obsolescent now, but capable of a very high performance. This is a cantilever high-wing monoplane with a wing-span of 58 ft. The wing is highly tapered both in plan and thickness, the fuselage is a narrow oval monocoque with an enclosed cockpit, and there is a small fixed fin and no fixed tailplane at all. Minimum sinking

Mr. Philip Wills, holder of the British distance record, and the Abbott-Baynes *Scud II*, holder of the British height record (piloted by Flt. Lt. Buxton). *Scud II* is not a high-performance machine, but for height records this is not so important as strong construction and a very high degree of skill in the pilot.

Hjordis I over Sutton Bank: The first really high-performance sailplane designed and built in England (by Slingsby Sailplanes of Kirby Moorside). Stability has been to some extent sacrificed to performance. Controls are very effective, but have no "feel," and *Hjordis* gathers speed very rapidly indeed if the nose is allowed to fall by 2 or 3 degrees.

speed is 2 ft. per second, and the best gliding angle is better than 1 in 20. With a stalling speed of 25 m.p.h. (indicated), its optimum flying speed is 27 or 28 m.p.h.

Being as clean as any flying machine possibly could be (the only projection is a venturi tube for the A.S.I.) it gathers speed very rapidly, and floats almost interminably if brought in above its lowest cruising speed. How many power pilots of the ordinary club and private-owner class could guarantee to fly such a high-efficiency machine at exactly 3 m.p.h. above its stalling speed through all normal manœuvres, such as turns and circles, including S-turns and sideslips within 50 ft. of the ground?

Yet there are a number of *ab initio* sailplane pilots who have the high degree of skill and accuracy to do this even in a fresh wind on a nice, bumpy, unstable day. And it is *necessary* to do this to achieve any worth-while results, and to put the machine down in a smallish space in hilly country.

Consider also the method of training in use in this country and in Germany. Dual instruction is hardly used at all—and the average *ab initio* glider pilot will be expected to make a straight and steady flight from a height of 250 ft., plus a normal landing, *after less than ten minutes flying time, divided up into spasms of fifteen seconds at a time!*

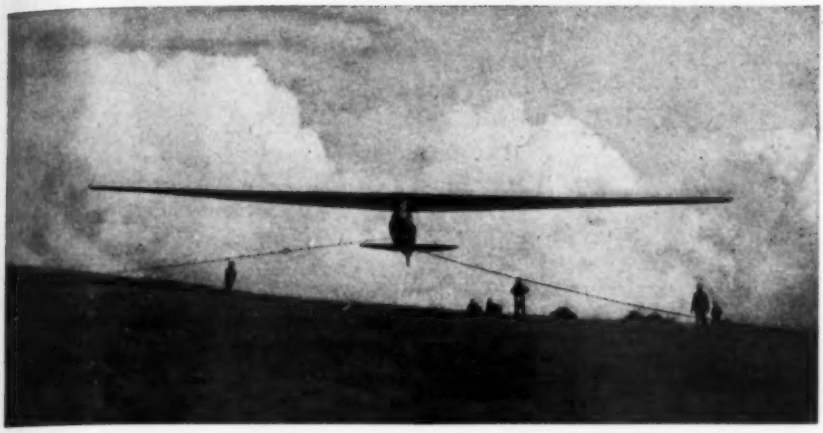
The astonishing thing is not that some of them are unsteady, but that so many of them are perfectly safe.

Of course, these machines are very easy to fly—or, rather, it does not matter if you don't fly them well. But the advanced sailplane is a very different bird, and though no very exceptional skill is needed to sit in them and put them down somehow, yet it takes hours of practice and concentration on straight flying and 45 deg. banked turns before the ordinary pilot can get out of them anything like the performance of which they are capable.

What difference does accurate pilotage make to a machine's performance? Here is one example: I was in Derbyshire last summer, flying a Grunau Baby—a sailplane of moderate efficiency on which I have had many hours' practice. Some thirty minutes' flying at what appeared to be its most efficient speed took us to 600 ft., at which height were other machines of similar performance. I then tried the experiment of flying 1 or 1½ m.p.h. slower, and after about fifteen minutes reached just on 1,000 ft., thereby joining machines of the next higher degree of efficiency. Had there been thermals about that day, this gain in height would have doubled my chances of being able to go off on a cross-country flight.

Just to make it more interesting, nearly all high-performance soaring in this country is done over rocky and mountainous country of up to 1,500 ft. above sea-level, in

It is difficult to imagine anything "cleaner" than the Rhönadler. It is so clean, in fact, that a highly varnished finish is well worth while—and for competition flying it is wax-polished all over.



Launching *Hjordis I*: Although the span is 50 ft., the chord is very narrow, and the wing loading is unusually high for sailplanes. On this machine Mr. Wills broke the British distance record by flying from Dunstable to Lowestoft, 105 miles.

weather that is composed for choice of unstable air, hailstorms, line squalls, thunderstorms, and the fiercest sort of cumulus cloud. It is only in such conditions that altitude records, for instance, can be set up. And the British altitude record of 8,300 ft. was set up in a machine much less stable than the Rhönadler by the pilot going up without blind-flying instruments through the middle of a very big thunder cloud. The pilot, incidentally, has done many hundreds of hours in the R.A.F., but he is said afterwards to have considered it the toughest job of his life.

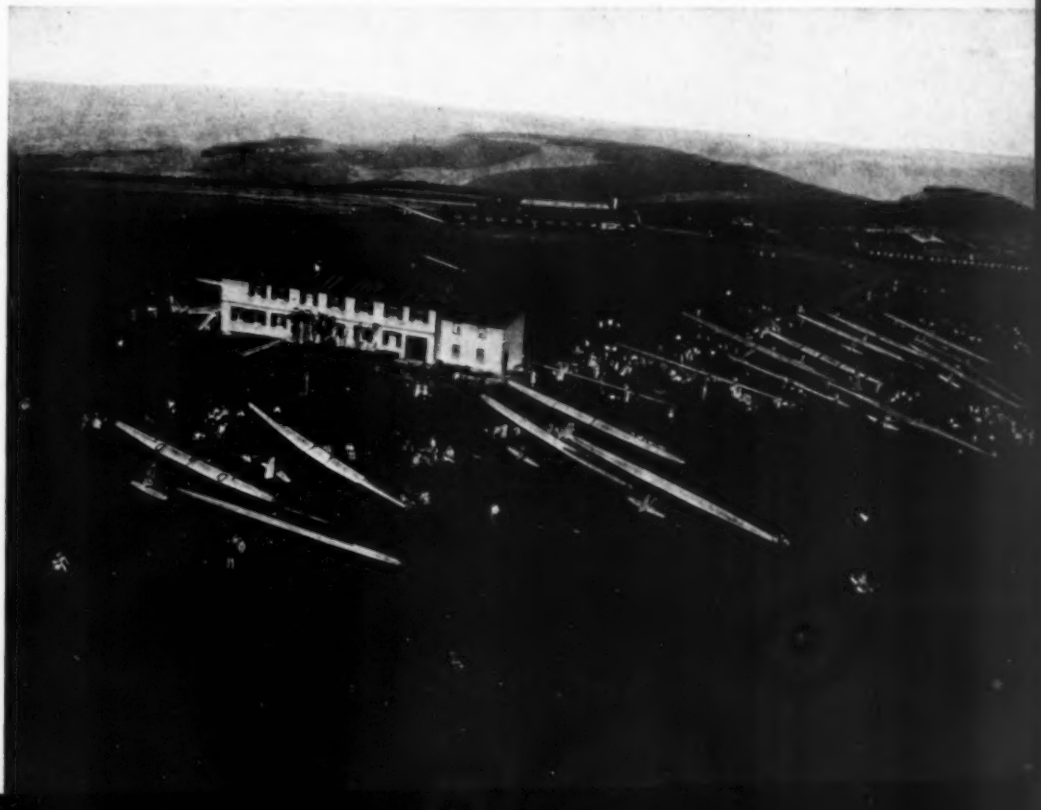
As "Indicator" said in the article already referred to, there are occasions where sailplane experience would be valuable. As a matter of fact, I'm sure that there are far more occasions than the power pilot realises. Apart altogether from greater accuracy and a far better understanding of the way of the air, no sailplane pilot would ever be caught out by one of these "mysterious down-currents" that have killed more than one pilot, and pushed many dozens of undercarriages through longerons. And there is another thing that the sailplane pilot cannot understand. Why has no King's Cup racer ever (so far as is known) used the common or garden cloud street to give him extra lift, and therefore a free bonus of 10 m.p.h. or more?

Just as the argument in the Navy about the advantages of training in sail will never be settled, so there is no end to the discussion of the worth of sailplane experience. But in Germany the Luft Hansa will not employ pilots who have not had sailplane instruction. In fact, the Luft Hansa pilots have clubbed together to own a high-performance sailplane which Peter Riedel, tired of roaring noisily in aeroplanes between Berlin and Hamburg day in and day out, succeeded in flying to Hamburg on his day off!

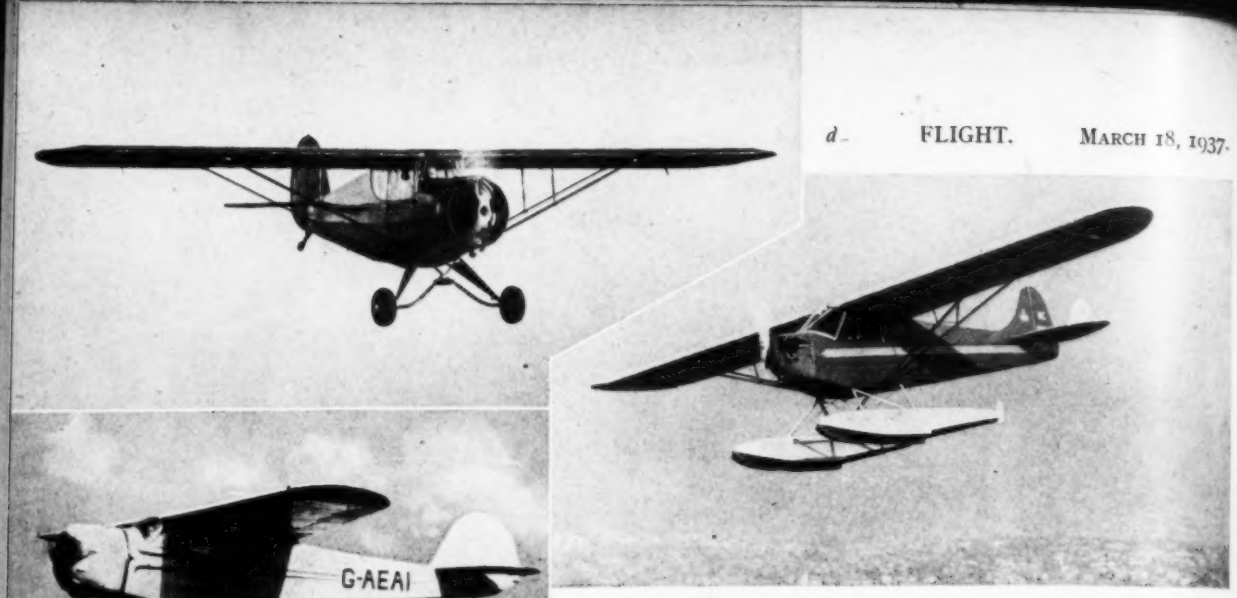
When, oh when, shall we see the great ones of Imperial Airways spending their leisure hours in a Hjordis II sailplane 5,000 ft. over the Surrey hills?

And the Royal Air Force, when will it come off its high horse and acknowledge that there is more to flying than watching the boost-pressure gauge? I can well remember the days when Air Force pilots thought less than nothing of the private power pilot because he often did not know how to do a slow roll. That feeling is passing now, I believe, and to be fair there are quite a number of eminent Air Force pilots who have found that there is a lot to learn in a sailplane.

And the light aeroplane pilot, too. Now that he may only fly on alternate Tuesdays at 6,000 ft. three miles North-North-West of Croydon provided he carries two wireless sets and a certified ground engineer in triplicate, might he not be persuaded that soaring is very easy to do safely, and extremely difficult to do competently—that the harder a sport is to master the more fascinating it is to try—and that he can, if he wants to, learn more about the art and science of flying in twenty hours in a high-efficiency sailplane than in 500 hours in the latest flapped and slotted conservatory with variable-pitch undercarriage? If you don't believe it, try a visit to Dunstable and see for yourself.



Aspect ratios: A picture taken at the Wasserkuppe in Germany some time ago showing the very big span and narrow chord that characterise all the high-performance machines that have yet been designed. The modern trend is towards the mid-wing type.



Three American private-owner types: The Cessna, the Porterfield (top left) and the Taylor Cub as a floatplane (right). As related elsewhere in this issue, all three have concessionaires in this country.

THE AMERICAN PRIVATE OWNER

How Long Distances Affect His Requirements: Use of Airline Facilities

By ROBERT C. CODMAN

THIS is an invitation to the British private aeroplane owner to visit the United States and to get acquainted with flying in that country. There are forty-eight states, ranging in size from 1,200 square miles to 265,000 square miles. As a matter of geographical fact, Boston, Mass., is nearly a hundred miles nearer to London than it is to San Francisco, California—which gives you some idea of the area that the American private owner has to roam in.

Because of these great distances the ultra-light, low-powered aeroplane is used chiefly to build up time around airports. The limitations of such types for cross-country flying in possibly high winds are well known, so we will pass them by with the statement that they are being produced in large numbers and *can* be used for cross-country work if one has plenty of time and patience.

The most popular type with the American private owner is the four-place cabin plane with an engine developing 250 to 350 h.p. Examples of this type are the Stinson, Waco, Beechcraft and Fairchild. The general requirements are long cruising range—600 miles or better—radio, and ample storage space for baggage. The latter must be accessible from the cabin as well as from the outside of the machine.

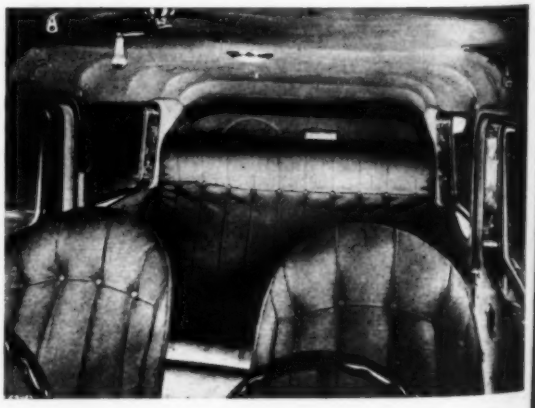
Long-range Touring

Let us see how aeroplanes of the type just outlined are used. Mrs. Nancy H. Love, of Boston, has some very interesting trips to her credit. She has flown from Boston to Los Angeles, California, twice in the last six months. The Beechcraft which she used has a range of nearly 800 miles, and on these trips it was flown about 700 miles between refuelling stops. On these two trips she got in about 60 hours at the wheel. On one trip the baggage consisted of nine suitcases and two golf bags, which fact emphasises the necessity for plenty of storage space. She is greatly impressed with the need for radio on such trips; the only occasion when she got off her course was when flying at 13,000 ft. just east of Los Angeles, where there were no beam facilities. Mrs. Love uses her Beechcraft to make day trips to New York from Boston for shopping or social engagements.

Another private owner at the Rhode Island State Airport has made twenty-one trips to Florida, each one of which has involved some three thousand miles of flying. These are not exceptional cases and they show the extreme distances covered.

There is still another class of private owner to whom the original cost of superperformance is no object. I refer to those who possess such types as the Vultee, Northrop, Lockheed and various multi-motored 'planes. This class of machine, showing a cruising speed of 180 m.p.h. or above, will make the trip from New York to Miami, Florida, in eight to nine hours, including stops for meals. This is the equivalent of a trip from London to Bucharest. In addition to the cabin devotees there are also owners such as Mr. Howard Hughes and Miss Jacquelin Cochran who have open-cockpit racing aircraft with power plants in excess of 1,000 h.p. While the number of people in this class is relatively small, the fact that they do exist shows the wide range of equipment operated by private owners or their pilots. One small airport was confronted with the problem of storing and servicing two machines for a private owner last summer. One was a single-motored, gullwing cabin Stinson and the other was a twin-motored Lockheed Electra, such as the airlines use. The owner used the single-motored job for short trips of 250 miles or so, and the larger ship for the longer trips.

An elaborate equipment of radiobeams, rotating beacon lights and teletype weather reports is maintained by the Department of Commerce between principal cities. By making use of these facilities the private owner is enabled to fly wherever he pleases day and night, according to his ability. The Department of Commerce insists that those flying the routes of the airlines or making use of the radio beam facilities shall qualify in blind flying for dirty-weather work. Pilots are directed at what altitude they shall fly and they must not deviate from that altitude without reporting the proposed change by radio. Ships without radio are forbidden to enter cloud areas on airline routes.



"Saloon car" interior appearance is the aim in the latest Stinson, another American type with British concessionaires.

Though Learning to Fly "By the Book" is Impossible, There are Many Potential Pupils Who Wonder What the Instructional Period Holds in Store : This Article Tells Them

By MAURICE A. SMITH

SOMEBODY once asked me "to explain exactly how one flew an aeroplane." I could only suggest that he proceeded at once to his local club, there to take a trial lesson. It is impossible to tell anyone exactly how to fly an aeroplane, though excellent books have been written for the benefit of the curious. Even to explain how to drive a car is extremely difficult, yet the movements concerned, save those for directional control, are straightforward and definite.

The control of an aeroplane may be described as "car steering in three axes"; one can learn, but one cannot be told how to do it. At different speeds and in different attitudes the controls vary in their effect. How would you care to be asked to explain the methods used in horsemanship? That is the nearest parallel in ground transport.

Nevertheless, there are thousands of people who wish to be told, in so many words, which button should be pressed and which lever pulled in order to force an aeroplane into the air and to cause it to descend, without obvious damage, on to the surface of an aerodrome. For their benefit I shall try to explain the sequence of events and the method of training.

FIRST STEPS

For his trial lesson a pupil can usually borrow goggles, helmet, and earphones. Later, the pupil will purchase his own equipment, and it is important to see that the helmet fits closely but comfortably, as small folds mean big wind whistles in the earphones when flying in an open cockpit, and bad hearing is annoying and may even be dangerous. The flexible tube from the earphones is plugged into the instructor's speaking tube, while the instructor's earphones are, of course, connected with the pupil's own speaking tube. Goggles, according to the design, and regardless of cost, can be uncomfortable even with sorbo cushions, and may restrict the vision, so thoughtful purchasing or, better still, expert advice are again advisable. Special flying boots are not really necessary, but some form of glove is desirable for winter flying.

The first flight often takes the form of a pleasure "flip" to enable the pupil to recognise the country around the aerodrome, and to give him some idea of things.

Before taking off the instructor will explain—in what seems, probably, to be a very casual way—the functions of the flying controls. Less casually, we may explain here that the small movable areas on the trailing edges of the main planes are called ailerons and are operated by sideways movements of the control column, otherwise known as the "stick"; the ailerons, primarily, form the control for banking, i.e., "leaning in" on turns to prevent skidding. The elevators are movable surfaces on the trailing edges of the tail planes, controlling climb and dive by, respectively, backward and forward movements of the stick. Lastly, the rudder bar directly controls the rudder for change of course; its use, however, is not confined to the lateral plane, as the pupil will discover later. A fourth control trims the tail plane for gliding; that is, by winding a handle or setting a lever the angle of the tail-plane or the pressure on the elevator is adjusted so

Shell Aviation News photograph.

into the AIR

that the nose of the aircraft does not need to be held down or up at different throttle openings.

During the first lesson the instructor will demonstrate the actual effect of the controls. The pupil will hear through the earphones, "Rest your hand lightly on the stick, holding it between two fingers and thumb, and notice the movements I make." (For the sake of clarity I am assuming a very voluble but precise instructor.) "First a small movement to the left side; the left aileron is lifted and the right is depressed, causing a turn about the longitudinal axis of the aircraft, due to the air pressure on the control surfaces. My left wing drops and so we bank to the left. If I move the stick farther over to the left and keep it in this position the nose lifts a little to the right, then the main planes no longer exert sufficient lift and the nose drops again, so. The momentary lift of the nose is due to the right aileron being depressed into the air stream and exerting drag. Now the same motions to the right; this time the right aileron is lifted and the left depressed, we bank, and the nose lifts a little to the left. Increase the bank and the nose drops as before."

Curiouser and Curiouser

The pupil by this time is fully aware of the fact that the nose is made to drop and the aircraft is tilted alarmingly by moving the stick sideways, and accordingly dislikes this control. That voice again: "Now for controls governing the climb and dive—that is, movements about the lateral axis. When I push the stick forward, down go the elevators and down also goes our nose and we gain speed. Notice that the controls feel heavier and the aircraft answers more quickly to small movements of the stick or rudder. Now ease the stick back and we start to climb. We lose speed and the controls become lighter to move. Pull the nose up more still and the lateral controls become sloppy and slow to take any effect. Finally we have hardly any control at all and the air-

craft seems to claw at the sky above and totter." At this point the pupil may be neglecting all controls, and straining every nerve forward in a vain attempt to help the aircraft to climb a bit harder. If an aeroplane is "stalled" it is not necessarily falling back on its tail. At the stalling point the controls become slack due to insufficient forward speed, but the aeroplane will continue to climb "stalled" for a time before actually falling temporarily out of control.

The aeroplane having regained an even keel and the pupil having regained his equilibrium, the action of the rudder is demonstrated. First to the right and then to the left. The rudder alone being moved, the aircraft "skids" sideways. The voice again explains how the outside wings, which are travelling faster, exert more lift than the inside ones and slowly cause the machine to bank, and how, later, the nose drops and the machine slips inwards.

The time has now come for the pupil to try each manipulation of controls for himself. The first lesson is in straight and level flying, followed by climbing, gliding and stalling. A voice through the speaking-tube says, "Take control of stick and rudder, notice a point on the horizon, and keep the nose on it. You have her." There follows a series of skidding turns, caused by just overdoing the correction every time, but a little practice soon puts this right.

The correct gliding and climbing angles are given in relation to the horizon, and the tail trimmer allows the attitude to be set for gliding without the necessity for pressure on the stick. Lessons in normal climbing and gliding turns follow, and the pupil begins to obtain real enjoyment from the business of taking control for short periods.

Turning Instinct

Turns are taught in three parts, "Going in," "Staying in," and "Coming out." Medium climbing and level turns with engine are quite simple to learn, but practice is needed until a sort of instinct is developed, which enables one to anticipate the slip in or out as it is about to happen, and put on sufficient bank and rudder together to execute a correct turn.

The secret of maintaining the same speed in the turn is to notice the position of the nose of the aircraft in relation to the horizon, and to keep it unchanged. Normal gliding turns need a little more care as bank must not be held off, and the speed must not be allowed to increase or decrease. A common fault is to go into the turn rather slowly, to slow up even more in the turn, to hold off bank, and then to remedy the mistakes suddenly, so coming out of a very jerky turn much too fast.

Steep turns are taught later in the course of instruction and it takes longer to grow accustomed to them. If the position of an aeroplane in a steep bank is considered, it is seen that each control surface is almost at right angles to the normal position in level flight. Hence the rudder becomes something of an elevator, and the elevator becomes a rudder. The nose is held up with the rudder, while bank, beyond the desired angle, is held off. The turn is tightened, if necessary, to prevent side-slipping—that is, greater backward pressure is applied to the stick.

In the case of steep gliding turns the nose is held at a constant position below the horizon and bank is not in this case held off. To come out, the stick is held well forward, and full opposite rudder and bank are applied.

One of the quite early lessons, and perhaps the most interesting of all those in plain flying, is in taking off; first with control of rudder only, then with stick only, and finally using both controls. There are very few things to equal the feeling of exhilaration when, with the machine's nose pointing accurately into wind, one opens the throttle, the tail lifts, and speed is rapidly gathered. But for one special point, the necessity for applying rudder to counteract a general tendency to swing one way or the other, the control movements are as one would expect; that is, tail set in flying position, stick a little forward at first to help lift the tail, and then gradually eased back until the actual take-off. The instructor will explain that the machine must not be climbed until ample flying speed has been gathered. This is an obvious safety measure, for in the event of an engine failure at the start of a steep climb the aeroplane will lose all flying speed before the gliding angle can be attained.

Landing instruction follows—or is coincident with take-off instruction—and this is much more difficult to follow. The correct moment to close the throttle must be judged in order that the glide may bring the aeroplane to the ground approximately at the right place on the landing area, but a much more serious difficulty is that of judging the moment to flatten out and then to feel the stall as the machine loses flying speed. During this period the stick must be eased progressively backwards until the moment of a full three-point touch-down is reached. The first tendency is to fly into the ground, bounce off, and stall at about twenty feet above it. On the next attempt, the flattening out may be overdone, and the machine be allowed to stall some twenty feet above the aerodrome.

Gradual Initiation

Thus the instruction goes on. To attempt to describe it in greater detail would merely alarm the beginner at what he imagines to be the complexity of the whole business. In actual practice the average individual picks up his knowledge steadily and easily over a period of hours, days, weeks and months—all without conscious effort except on those "off days" (especially during the landing period) which ninety-nine out of a hundred of us experience.

The pupil will gradually assimilate the technique of correct approaches without which the ability to put a machine gently on the ground is valueless; will learn the refinements of that technique, such as the side-slip to loose height without gaining forward speed; will find how to taxi an aeroplane across the aerodrome and to manœuvre it into any required position; and will memorise the safety rules regarding precedence in taking-off and landing, as well as in the air. Likewise he will be initiated into that ritual for engine starting, designed to safeguard the limbs and lives of the ground engineers, and (later, perhaps) into the associated ritual of "running-up" the engine to safeguard his own neck. The instruments, which may so far have seemed to bear surprisingly little relation to his flying, will be introduced to him and the importance of their friendship emphasised; and so on until—the first solo.

The First Solo

The feeling on making one's first solo flight varies according to circumstances. At a few schools it is the signal for a combined "farewell and welcome back" party, and people assemble to view the ordeal. The pilot feels very much in the limelight and appreciably more nervous. Far more often another method makes it easier for him. During one of the final pre-solo lessons in landing and taking-off—usually referred to as "circuits"—the aeroplane being on the ground, the instructor casually remarks that it is time the pupil flew solo and there and then disembarks from his cockpit and sends him off for a lone circuit. The pupil finds that the aeroplane feel lighter and livelier, but otherwise exactly as it was two minutes before when the instructor sat in front. One generally flies better solo having no instructor to depend on or answer to. The pupil really knows, too, that he has full control (he hopes) for previously it was hard to remove all doubt from his mind that the instructor was not giving a slight helping hand in front, even though he occasionally waved both arms aloft to allay the suspicion.

Not until the second solo flight does the lack of a guiding hand in front become noticeable, and then more from a feeling of loneliness and isolation from Mother Earth than from a need of it.

For completion of the preliminary training there is still map reading and cross-country flying, perhaps the two most enjoyable parts of the whole business.

(*Concluded on page* 276.)

Topics of the Day

Metamorphosis

LOOKING back over the past year I cannot help feeling that somewhat odd changes have occurred in the whole business of amateur flying.

There are fewer full-size light-aeroplane types on the market, but those which remain are certainly better and more suitable for the use of the amateur owner; one or two provide really good value for money. Secondly, there has been a tremendous increase in the number of low-powered aeroplanes which are being sold at prices as low as £200; some of them are good value, but others do not appear to fit into any obvious niche in the market.

The reasons for this surprising state of affairs are quite simple. Many of the firms which, in different circumstances, might be making a really big effort to interest the owner and prospective owner, are much too busy with their part in the rearmament programme. Those which remain have rationalised their production, and are producing one specialised type which is suitable either for school work or for private ownership. At the same time, it has appeared that full-size light aeroplanes have, for the present at any rate, a limited market, and an attempt is being made to bring in some part of that mass of amateur pilots who cannot afford to buy them and operate them. Hence the ultra-lightweight.

Very few of the manufacturers of these babies can honestly believe that the mysterious man-in-the-street is going to buy them in thousands. But they do hope that a few hundreds out of the thousands of "A" licence pilots may now feel that aeroplane ownership is a reasonable proposition.

Uphill Work

THESE manufacturers must have patience. The average club pilot is not going to rush out and buy a machine which looks nice on paper. He or she will wait and wait until one or two of these ultra-lightweights have proved their worth—perhaps after being taken over by different clubs for solo training and "fun-flying."

Club engineers are very sound and cynical people; if they have any say in the matter the machines which are eventually bought by the clubs will be satisfactory from the mechanical point of view, and a few months' flying by good and bad pilots will be enough to show which of the machines are fit to be owned.

Let us not have any false ideas about this ownership business. For the cost price of a good ultra-lightweight I can put in something like 200 hours of responsibility-free flying in club aeroplanes—and fast, full-size, proven aeroplanes at that. It is pleasant to have one's own aeroplane, to be independent of the need for booking, and to be able to leave it where one pleases for as long as one likes. But an ultra-lightweight has got to be good before I buy, so to speak, 500 hours' flying, straight off, at even the lowest of contract rates. And that is what ownership amounts to—plus the freedom and the fun thereof.

It has taken the sponsors of the Drone many years to obtain the confidence of people in general. The late Mr. Lowe-Wylde and Mr. Kronfeld have been the pioneers, and other manufacturers should not have quite the same trouble. Nevertheless, this first full year of ultra-lightweights must be free from serious accident, and the engines must be reliable, or we shall be back just where we were before. It is a great temptation to fly a low-powered aeroplane all-out all the time, but that is asking for trouble; and if any bright young things feel that they are clever enough to aerobat machines which have not been stressed for such work, then there will be breakages, and nobody will ever buy another ultra-lightweight. All will suffer for the carelessness of the few.

The Clubs

WHAT with the Reserves and the Supplementary Reserves, some of our clubs are in for a lean year or two, and many of them, despite the subsidy which we all hope will continue to be paid, may fade out of the picture. So far, no great falling-off in support has been noticed, but the fact that flying membership is not increasing, even in these days, is proof of the number of prospective members who are being lost.

Remembering their work during the past ten years or more, the clubs surely deserve something better than an ignominious failure, or, at the best, a lingering existence. Luckily, we can hope not only that the subsidy will be continued on the same, or even on a more generous, scale, but that something will be done to encourage "A" licensees to continue with their flying.

There is, after all, a host of people who cannot afford the time to do Reserve training, and it is better for the future of flying in general (apart from its mere military value) that people should fly of their own free will—*and* pay for it. Pilots who have paid to learn, and are still paying to fly, are the sort of people who are going to be the most useful. Such keenness should not go unrewarded. I know at least two club pilots, both of them over-age as far as immediate Service possibilities are concerned, who have spent upwards of £3,000 on their favourite pastime since their light aeroplane clubs were first formed. And neither of them has ever owned a machine.

These are the pilots who are really helping to make flying a commonplace. Anybody can be *paid* to fly.

INDICATOR.

Private Flying

LONDON

MEMBERS of the London Aeroplane Club put in 55 hr. 55 min. during last week, and Mr. H. Kendall made his first solo flight. The Club will be closed for the Easter holidays from sunset on Thursday, March 25, until 10 a.m. on Tuesday, March 30.

YORKSHIRE

Club aircraft flew 7 hr. 50 min. only last week, bad weather prevailing generally. Mr. W. E. Illingworth has rejoined the Club as a flying member, Mr. P. H. Barran is a new flying member and Mr. A. Waddington has become an associate member.

LEEMING

Flying times for March to the 12th totalled 44 hr. 55 min. New members are Mr. S. H. Wailles and Mr. D. E. Catton. First solo pupils are Mr. R. White and Mr. J. Rowntree, while Mr. I. D. F. Proctor has completed all the tests for his "A" licence.

HANWORTH

New members of the London Air Park Flying Club are Messrs. A. J. Coster, Dykstra, R. L. Williams, Edmonds (National League of Airmen) and R. Miller. Flying time for the week amounted to 42 hr. 55 min., the majority of these hours being flown on Saturday.

SOUTH COAST

Over thirty hours' flying has been done during the week. Mr. R. W. Wright has gone solo, while Mr. F. C. White has obtained his "A" licence. New members are Messrs. R. W. Wright, S. W. R. Howell and J. Sunter. Some thirty members of the Club went to Lympne for the annual dinner and dance, some flying and others by car.

BRISTOL AND WESSEX

For the week ended March 13 flying times totalled 18 hours. Flying has again been affected by adverse weather conditions, two "A" licence pupils being held up by the weather. The Club's new private owner, Mr. J. H. Lewis, flies to Bristol from town for week-ends on his Miles Hawk.

BORDER

During the past week flying times have been curtailed by the severe weather. Flt. Lt. Potter carried out a charter flight to Catterick last Tuesday week, but unfortunately had to land in a field owing to the bad visibility and low cloud. As soon as the weather cleared he flew the Hornet to Catterick. The next day he attempted to return, but was advised by the Met. people to remain until the afternoon, when the return journey was accomplished without undue difficulty. The new hangar is progressing favourably, also the drainage system, which is now in full swing.

MIDLAND

Flying time for the fortnight ended March 12 amounted to 11 hr. 35 min. dual, 16 hr. 30 min. passenger, and 13 hr. 20 min. solo. New members who have joined the Midland Aero Club are Messrs. D. G. Aslin, B. Bray, A. Garfield, D. M. James, D. H. Clifford-Smith (flying), and Messrs. F. A. R. Hill and K. I. McClean (ordinary). Messrs. Sutcliffe and Desmond flew a B.A. Swallow (G-ADXE) to Leipzig for the Fair. A Hornet Moth (G-ADKE) has been added to the Club's fleet of privately owned machines.

SCOTTISH

In December, January and February of last year the Scottish Flying Club logged 363 hours flying; the corresponding figure this year is 143 hours—an indication of the weather conditions in the North. Adverse weather in February permitted only one first solo to be made, though twenty-eight pupils were under instruction. During the month the Club's Super Drone came into service. Lectures on aviation subjects have been organised, and on the social side three very good clubhouse dances have been held.

A. S. T.

During February Air Service Training had the honour of a visit by Air Marshal Sir Charles S. Burnett, K.C.B., C.B.E., D.S.O., the Air Officer Commanding Training Group, R.A.F., who carried out an inspection of the R.A.F. *ab initio* pupils and the school aircraft.

Results of the recent 2nd Class Navigators' examination showed that out of eight Hamble entries six students had passed, one had failed in one subject, and the other failed the examination by one mark only. Another handsome silver Challenge Cup has been presented by Mr. T. O. M. Sopwith. This will be competed for annually by the civilian students, and a replica will be given to the one who has the best all-round flying record for the year. A. S. T. now has ten trophies for competition, four for flying, four for the various ground subjects and two for sailing.

New students during the month were Flt. Lt. J. F. Palmer, Mr. Gim Soo Toh and Mr. G. C. Arya. Mr. Crack left on the completion of his ground engineer's course and with the offer of a post in the Air Ministry Aeronautical Inspection Department. Mr. Stok returned to Holland on the completion of his training.

C. A. S. C.

On Sunday last members flew 4 hr. 30 min. Owing to extremely bad weather the Territorial Army Co-operation flight had to be abandoned.

REDHILL

Hours for the week ended Friday, March 12, amounted to 37 hr. 15 min. There are three new flying members, and Messrs. Shearman and Davies have passed their "A" licence tests.

SOUTHEND

Flying was normal during the week, but on Saturday machines were flying to capacity the whole day. In spite of the heavy rain, the surface of the aerodrome remains in a fit state for landing of all types. The Club's new chairman presided at his first club supper on March 12, and the evening proved an outstanding success.

NORFOLK AND NORWICH

During the past week members flew for over thirty-eight hours and Mr. W. E. Trevithick went solo. Last Thursday afternoon, in response to the Club's invitation, they were visited by members of the Norfolk County branch of the N.A.L.G.O., and so great was the response that the members had to be split into two parties, the first of which were entertained on Thursday. Afterwards they were taken up by Mr. Stevenson and Mr. D. G. Moynihan in Club machines. The second party will be visiting the Club on Thursday, March 25.

BROOKLANDS

During a week of very mixed weather there was one first solo, that of Mr. Hardman. Flying was possible on five days, and 53 hours were logged. Last Monday week Mr. Geoffrey Quill left for Vienna on a Leopard Moth, the property of Prince Kinsky, and on Wednesday week the Hordern-Richmond twin-engined monoplane visited the aerodrome, members being very impressed by its performance. Another visitor was the Cessna. A third new machine for the re-equipment of the Brooklands Flying Club has arrived and has started to earn its keep.

CINQUE PORTS

Among visiting pilots to the Club last week were David Llewellyn on his return from Khartoum after experiencing extraordinary bad luck on his Cape record attempt. He had the misfortune to suffer "perishment" of the rubber lining of an oil return pipe. Deciding to land in the desert to look over the trouble, he was met by a quite friendly, although armed-to-the-teeth, tribe of Bedouins. These gentlemen offered to make him tea, and proceeded to milk one of their camels, which Mr. Llewellyn says is a poor substitute for a cow.

The report of the Cinque Ports Flying Club dinner and dance appears on p. 252.

Leicester Less Oratory

AT the Leicestershire Aero Club's dinner and ball at the Grand Hotel, Leicester, last Friday, there was one speech. It consisted of six words—"Ladies and gentlemen, you may smoke." Even the Club's president, Mr. Lindsay Everard, M.P., connived at this rather praiseworthy conspiracy of silence when he turned up later in the evening from a political meeting.

The chairman of the Club, Mr. Trevor T. Sawdy, with Mrs. Sawdy, received the guests, and the Lord Mayor of Leicester, Ald. A. H. Swain, was also present. The Club, which operates the airport at Braunstone for the municipality, has some good friends among the City Elders, and the Lord Mayor himself has the right outlook. A few days before he had enjoyed a trip with Flt. Lt. Tommy Rose, who happened to call at Braunstone.

For ourselves, we had the pleasure of meeting that arch-enthusiast Mr. J. W. Tomkins, who, it may be recalled, reconditioned a Gloster Gamecock a year or two ago and operated it from one of the fields of his farm. He purchased it from the Air Ministry for £25, and he told us how he and Major Chater-Lea put in many hours of blacksmith work to dismantle the rusted-and-locked-solid Jupiter VI motor. This was replaced by a Jupiter VIII and then by a Mercury III, a *pair* of which the indomitable Mr. Tomkins secured for the equally noteworthy sum of £9.

He had plenty of fun with the Gamecock, mostly aerobatic, but those anxious to follow his example and obtain some such ex-Service snip should note that the venture demanded some 2,000 man-hours of work and that Mr. Tomkins has a file of 260 letters relating to the C. of A.

A collapsed undercarriage and a nose-over ended this very sporting effort.

CAVALCADE of the CLUBS

What the Prospective Member Wants to Know : Locations, Instructional Fees, Hire Charges and Special Courses.

ABERDEEN.—NORTH BRITISH AERO CLUB, Dyce Airport, Aberdeen: *Fleet*: 2 D.H. Moths. *Normal Rates*: Dual, £2 2s. 6d. an hour; solo, £1 17s. 6d. an hour.

BARNSTAPLE.—BARNSTAPLE AND NORTH DEVON FLYING CLUB, Heanton Court Aerodrome, Barnstaple:—*Fleet*: 2 Gipsy I Moths. *Normal Rates*: Dual, £2 an hour; solo, £1 15s. an hour.

BELFAST.—NORTH OF IRELAND AERO CLUB, Newtownards, Co. Down:—*Fleet*: 1 Avro Cadet. *Normal Rates*: Dual, £2 an hour; solo, £1 15s. an hour.

BIRKENHEAD.—BIRKENHEAD AND WIRRAL FLYING CLUB, Newburns Lane, Oxton, Birkenhead. (Flying at Hooton).—*Fleet*: Purchase of Drone and Trainer under consideration. *Normal Rates*: 10s. an hour; special courses in construction and maintenance.

BIRMINGHAM.—MIDLAND AERO CLUB, LTD., Castle Bromwich Aerodrome, Birmingham:—*Fleet*: 3 Moth Majors and 1 Tiger Moth. *Normal Rates*: Dual, £2 an hour; solo, £1 10s. an hour; blind flying, £2 an hour. *Special Rates*: Cross-country flying on 90 m.p.h. basis £1 10s. an hour; 1 hour free flying in every 15.

BOURNEMOUTH. — BOURNEMOUTH FLYING CLUB, Bournemouth Airport, Christchurch, Hants:—*Fleet*: 3 Moths and 1 Westland Widgeon. *Normal Rates*: Instruction and advanced dual, £2 an hour; solo from £1 10s. an hour; contract rate from £1 7s. an hour.

BRIGHTON.—SOUTH COAST FLYING CLUB, The Airport, Shoreham, Sussex.—*Fleet*: 3 Gipsy Moths (additional machines can be obtained from Brooklands when necessary). *Normal Rates*: Dual, £2 2s. an hour; solo, £2 an hour; solo after 25 hours and test, £1 17s. 6d. an hour.

BRISTOL.—BRISTOL AND WESSEX AEROPLANE CLUB, LTD., Bristol Airport, Whitchurch, Bristol:—*Fleet*: 2 B.A. Swallows (Pobjoy and Cirrus) and 1 Avro Cadet. *Normal Rates*: Dual, £2 2s. an hour; solo, £1 15s. and £1 10s. an hour; advanced dual, £2 10s. an hour; 10 per cent. reduction for flying done before 2 p.m. except on Sundays and Bank Holidays. *Special Rates*: "B" licence, blind flying and instructors courses at reduced terms.

CAMBRIDGE. — Marshalls FLYING SCHOOL and THE CAMBRIDGE AERO CLUB, Fen Ditton Aerodrome, Cambs:—*Fleet*: 8 Gipsy Moths, 1 Puss Moth and 1 Monospar. *Normal Rates*: Dual and solo, £1 10s. an hour.

CANTERBURY.—KENT FLYING CLUB, Bekesbourne Aerodrome, Canterbury, Kent:—*Fleet*: 3 Miles Hawks and Miles Falcon. *Normal Rates*: Dual, £2 an hour, and solo £1 10s. an hour on Hawks; dual, £2 10s. an hour, and solo £2 an hour on the Falcon; blind flying and instructors courses, £2 an hour.

CARDIFF.—CARDIFF AEROPLANE CLUB, LTD., Cardiff Airport:—*Fleet*: 2 Gipsy I Moths and 1 Miles Hawk Major. *Normal Rates*: Dual, £2 an hour and solo £1 10s. an hour on Moths; dual, £2 5s. an hour and solo £2 an hour on the Hawk. *Special Rates*: £1 5s. an hour for six hours or more purchased in advance, and £1 an hour for 25 hours or more purchased in advance on Moths; the respective figures for the Hawk are £1 15s. and £1 10s. an hour.

CARLISLE.—BORDER FLYING CLUB, LTD., Carlisle Aerodrome, Kingstown, Carlisle:—*Fleet*: 2 Gipsy II Moths and 1 Hornet Moth. *Normal Rates*: Dual and blind flying instruction, £1 17s. 6d. an hour; solo, £1 12s. an hour. *Special Rates*: £1 10s. an hour on the Hornet, and £1 5s. an hour on Moths after 30 hours.

COVENTRY.—COVENTRY AEROPLANE CLUB, 25, Wainbody Avenue, Coventry:—*Fleet*: 2 B.A. Swallows. *Normal Rates*: Dual, £2 an hour; observed solo, £1 15s. an hour; later solo, £1 10s. an hour.

DONCASTER.—DONCASTER AERO CLUB, The Airport, Doncaster:—*Fleet*: 2 Moths and 1 Cirrus Swallow. *Normal Rates*: Dual, £1 15s. an hour; solo, £1 10s. an hour.

DUBLIN.—IRISH AERO CLUB, Baldonnel Aerodrome, Dublin:—*Fleet*: 1 Gipsy I and 1 Gipsy III Moth. *Normal Rates*: Dual, £2 an hour; solo, £1 10s. an hour.

EASTBOURNE.—EASTBOURNE FLYING CLUB, LTD., Wilmington Aerodrome, Sussex:—*Fleet*: 2 B.A. Swallows and 1 Gipsy Moth. *Normal Rates*: Dual, £2 an hour; solo, £1 15s. an hour.

EDINBURGH.—EDINBURGH FLYING CLUB, LTD., Macmerry Aerodrome, East Lothian:—*Fleet*: 1 B.A. Swallow and 1 Moth Major. *Normal Rates*: Dual and advanced dual, £2 5s. an hour; solo, £1 10s. an hour.

ELY.—ELY AERO CLUB, City Chambers, Market Street, Ely, Cambs:—*Fleet*: 3 Kronfeld Drones (2 larger machines shortly to be purchased). *Normal Rates*: Solo and ground instruction, 15s. an hour. *Special Rates*: 10s. an hour after 40 hours' flying; long-period hire, £1 5s. a day.

FOLKESTONE.—CINQUE PORTS FLYING CLUB, LTD., Lympne, Airport, Kent:—*Fleet*: Gipsy I Moths, B.A. Swallow, Tiger Moth, Moth Major, Leopard Moth, Puss Moth, Monospar and Aeronca. *Normal Rates*: Dual, £2 an hour, and solo £1 10s. an hour for Gipsy Moths and Swallow; dual, £2 5s. an hour and solo £1 15s. an hour for Tiger and Moth Major; dual, £3 10s. an hour and solo £3 an hour for Leopard and Puss; dual, £5 an hour and solo £4 an hour for the Monospar; and solo, £1 5s. an hour for the Aeronca. *Special Rates*: "B" licence night flight inclusive of insurance and instruction, £20; "B" licence lecture course, £10 10s.; second-class navigator's course, £15 15s. (additional); long-period hire arranged at special rates.

GLASGOW.—SCOTTISH FLYING CLUB, LTD., Renfrew Aerodrome, Renfrew:—*Fleet*: 4 Gipsy III Moths, 1 Gipsy Major Moth, 1 Leopard Moth, 2 Hornet Moths, and 2 De Luxe Drones. *Normal Rates*: Dual, advanced dual and blind flying, £2 an hour; solo, £1 10s. an hour (£2 an hour in Leopard); 15s. an hour for Drone flying. *Special Rates*: £1 10s. an hour for first 15 hours' solo; £1 5s. an hour for next 15 hours' solo, and £1 an hour for all later solo.

GLOUCESTER.—COTSWOLD AERO CLUB, LTD., Gloucester and Cheltenham Airport, Cheltenham Road, Gloucester:—*Fleet*: 1 Moth and 1 Desoutter. *Normal Rates*: Dual, £2 an hour; solo, £1 10s. and £1 15s. an hour.

GRIMSBY.—LINCOLNSHIRE AERO CLUB, Waltham, Lincs:—*Fleet*: 1 B.A. Swallow, 1 D.H. Fox Moth, 1 Blackburn Bluebird, and 1 Blackburn B.2 Trainer. *Normal Rates*: Dual, £2 an hour; solo, £1 10s. an hour.

HARROGATE.—The Harrogate Club is embodied in the York and Leeming Flying Club until such a time as the Corporation decide to go forward with their aerodrome scheme.

HULL.—HULL AERO CLUB (1934) LTD., Hedon Aerodrome, Hull:—*Fleet*: 2 Cirrus III Moths and 1 Puss Moth (a B.A. Swallow may shortly be added). *Normal Rates*: Dual, £1 15s. an hour; solo and advanced dual, £1 10s. an hour. *Special Rates*: £1 5s. an hour for 5 hours paid in advance; £1 2s. 6d. an hour for 10 hours, and £1 an hour for 20 hours. A scholarship scheme is in force whereby, after a trial lesson, pupils are given a minimum of 12 hours' dual and 3 hours' solo for £15.

IPSWICH.—IPSWICH AERO CLUB, The Airport, Ipswich:—*Fleet*: 1 D.H. Moth (later to be supplemented by a Miles Whitney Straight). *Normal Rates*: Dual, £2 an hour and solo £1 10s. an hour; advanced dual and solo, £2 5s. an hour and £1 15s. an hour respectively. *Special Rates*: £1 7s. 6d. to £1 13s. 6d. an hour for contract flying with prepayment; free flying at the rate of 15 minutes for every five hours; three hours' licence-renewal solo at £1 an hour.

ISLE OF WIGHT.—ISLE OF WIGHT FLYING CLUB, LTD., Lea Airport, Sandown, I.O.W.:—*Fleet*: 1 Spartan Arrow and 1 Spartan two-seater. *Normal Rates*: Dual and solo, £1 10s. an hour.

LEAMINGTON.—LEAMINGTON, WARWICK AND DISTRICT AERO CLUB, Bishop's Tachbrook, Leamington:—*Fleet*: 2 Gipsy I Moths. *Normal Rates*: Dual, £2 an hour; solo, £1 10s. an hour.

LEEDS.—YORKSHIRE AEROPLANE CLUB, LTD., Leeds-Bradford Aerodrome, Yeadon, Near Leeds:—*Fleet*: 2 Gipsy I Moths, 1 Gipsy II Moth, 1 Cirrus III Moth, 1 Hornet Moth, and 1 Leopard Moth. *Normal Rates*: Dual and solo instruction on Moths, £1 15s. to £2 an hour; cross-country instruction, £1 12s. 6d. to £1 17s. 6d. an hour; cross-country instruction on Hornet and Leopard, £2 to £2 2s. 6d. an hour; up to 50 hours on Moths, solo £1 10s. to £1 15s. an hour; on Hornet and Leopard, £1 15s. to £2 an hour; over 50 hours' on Moths, £1 7s. 6d. to £1 10s. an hour; over 50 hours on Hornet and Leopard, £1 12s. 6d. to £1 15s.

LEICESTER.—LEICESTERSHIRE AERO CLUB, LTD., The Airport, Braunstone, Leicester:—*Fleet*: 1 Gipsy III Moth, 1 Gipsy II Moth, and 1 B.A. Cirrus-Swallow. *Normal Rates*: Dual and blind-flying instruction, £1 16s. an hour; solo and advanced dual, £1 10s. an hour. *Special Rates*: Night flying, £2 2s. an hour; cross-country flying (on 96-m.p.h. basis), £1 10s. an hour.

COUNTY FLYING CLUB, LTD., 16, New Street, Leicester:—*Fleet*: 2 Kronfeld Drones, 1 Ground Trainer, and 1 Flying Ground Trainer. *Normal Rates*: Instruction on Trainers, 9s. an hour; instruction on Drone, 15s. an hour; solo on Drone, 15s. an hour.

LIVERPOOL.—LIVERPOOL AND DISTRICT AERO CLUB, Speke Airport, Liverpool (and at Hooton Park):—*Fleet*: 3 D.H. Tiger Moths, 1 Leopard Moth, 2 B.A. Swallows, and 1 Avro Avian. *Normal Rates*: Dual and solo, £1 10s. an hour; dual and solo on Leopard, £1 16s. an hour.

LONDON.—AIRWORK SCHOOL OF FLYING, Heston Airport, Hounslow, Middlesex:—*Fleet*: 5 Avro Cadets (Gipsy Major engines), 1 Leopard Moth, 1 Miles Whitney Straight. *Normal Rates*: Dual and solo to "A" licence, £3 10s. an hour; solo, £2 2s. an hour. *Special Rates*: "B" licence, £350; navigation instruction, 10s. an hour; long-period hire, £4 4s. per day, exclusive of fuel and oil. The Household Brigade Flying Club and the Old Etonian Flying Club use the Airwork fleet.

BROOKLANDS FLYING CLUB, LTD., Brooklands Aerodrome, Weybridge, Surrey:—*Fleet*: Gipsy I, Gipsy II, Puss and Leopard Moths (Gipsy Is shortly to be replaced by Tiger Moths). *Normal Rates*: Dual and solo, £2 5s. an hour; advanced dual, £2 10s. an hour.

CIERVA AUTOGIRO CO., LTD. (Flying School), London Air Park, Feltham, Middlesex:—*Fleet*: 4 C.30 Autogiros. *Normal Rates*: Dual and solo, £3 an hour. *Special Rates*: Complete "A" licence course, £35; blind flying instruction, £3 an hour; night flying instruction, £6 an hour; special reductions for flying hours purchased in advance; machines may be hired for one to two days by approved pilots.

CIVIL AVIATION SERVICE CORPS, 10, Berkeley Street, London, W.1:—Instruction is carried out at both Cambridge and Gravesend where the normal fleets are available for the use of members. *Normal Rates*: Dual and solo, 27s. 6d. an hour at Cambridge; dual and solo, 30s. an hour at Gravesend, where Moths may be hired at 50s. a day.

CROYDON FLYING CLUB, Croydon Aerodrome, Surrey:—*Fleet*: 3 Moth Majors, 2 Puss Moths, 1 Gipsy III Moth and 1 Dragonfly. *Normal Rates*: Dual, £3 an hour; solo, £3 an hour. Special rates for "B" licence, night flying and radio instruction.

HERTS AND ESSEX AEROPLANE CLUB, Broxbourne Aerodrome, Nazeing, Herts:—*Fleet*: 5 D.H. Moths, 1 B.A. Swallow, 1 Miles Hawk, 1 Stinson Junior. *Normal Rates*: Dual instruction, £2 an hour; solo, 30s. and 25s. an hour; blind flying, £2 an hour. *Special Rates*: Contract solo, £1 an hour; dual and solo on Stinson, £3 an hour; day hire of Stinson, £4; long-period hire of Stinson, £3 10s. a day.

INSURANCE FLYING CLUB, LTD., 54, Leadenhall Street, E.C.4:—Only open to members of the insurance community; flying at Hanworth. *Fleet*: 2 Gipsy Moths and 1 Cirrus Hawk. *Normal Rates*: Dual, £1 5s. an hour; solo, £1 an hour; blind flying £1 10s. an hour.

LONDON AEROPLANE CLUB, Hatfield Aerodrome, Herts:—*Fleet*: 6 Tiger Moths, 3 Hornet Moths and 1 Dragonfly. *Normal Rates*: Dual, £2 an hour; solo, £1 10s. an hour; blind flying, £2 10s. an hour; dual and solo flying in the Dragonfly £5 10s. and £5 an hour respectively.

LONDON AIR PARK FLYING CLUB, Tanworth Aerodrome, Feltham, Middlesex:—*Fleet*: 4 Gipsy Moths and 4 Aeronca C.3's. *Normal Rates*: Dual, £2 5s. an hour; solo, £2 an hour; blind flying, £3 10s. an hour for Moths. Dual £1 10s. an hour and solo, £1 an hour for Aeroncas. *Special Rates*: For first 50 hours after "A" licence, £1 17s. 6d. an hour, afterwards £1 15s. an hour in Moths; long-period hire, £4 a day (without fuel or insurance) in Moths.

ROYAL AIR FORCE FLYING CLUB, Hatfield Aerodrome, Herts:—Membership limited to Service and ex-Service pilots. *Fleet*: 1 Tiger Moth, 1 Puss Moth and 2 Gipsy Moths. *Normal Rates*: £1 an hour for short and long-period hire.

SURREY FLYING SERVICES, LTD., Croydon Airport, Surrey: *Fleet*: 6 Gipsy Moths. *Normal Rates*: Dual, £3 an hour; solo, £2 15s. an hour. *Special Rates*: Other courses by arrangement; wide range of machines for hire to approved pilots.

MAIDSTONE.—MALLING AERO CLUB, West Malling, Kent:—*Fleet*: 2 Gipsy I Moths, 1 Gipsy III Spartan, and 1 Hawker Tomtit. *Normal Rates*: Dual and solo, £1 15s. an hour; £1 17s. 6d. an hour on Saturdays and Sundays; 2s. 6d. extra on Tomtit. *Special Rates*: Reduction of 5s. an hour for members who have flown more than 50 hours with the Club; further reduction of 2s. 6d. for those exceeding 100 hours' flying.

MANCHESTER.—LANCASHIRE AERO CLUB, Woodford, Cheshire:—*Fleet*: 4 Avro Cadets. *Normal Rates*: Dual and solo, £2 an hour.

NEWCASTLE.—NEWCASTLE-UPON-TYNE AERO CLUB, LTD., Woolsington Airport, Kenton, Newcastle:—*Fleet*: 3 Gipsy I Moths, 1 Puss Moth, 1 Tiger Moth, and 1 B.A. Swallow. *Normal Rates*: Dual and solo instruction, £1 16s. an hour on Moths and Swallow, £2 16s. an hour on Tiger and Puss; normal solo, £1 6s. an hour on Moths and Swallow, £1 12s. an hour on Tiger and Puss. *Special Rates*: Night flying instruction, £4 an hour; long-period hire on Moths and Swallow, £2 10s. (Monday to Friday), and £3 (Saturday and Sunday) a day; £3 and £4 a day respectively for Puss and Tiger; weekly rates, £15 and £20 respectively.

NORTHALLERTON.—YORK AND LEEMING FLYING CLUB, Leeming Aerodrome, Yorks. See under *York*.

NORTHAMPTON.—NORTHAMPTON AERO CLUB, Sywell, Northampton:—*Fleet*: 1 Gipsy I Moth. *Normal Rates*: Dual and solo, £2 an hour.

NORWICH.—NORFOLK AND NORWICH AERO CLUB, LTD., Municipal Aerodrome, Norwich:—*Fleet*: 2 Gipsy I Moths, 1 Gipsy II Moth, and 1 Hornet Moth. *Normal Rates*: Normal and advanced dual, £1 15s. an hour; solo, £1 10s. an hour for Moths and £1 15s. an hour for the Hornet.

NOTTINGHAM.—NOTTINGHAM FLYING CLUB, Tollerton, Nottingham:—*Fleet*: 2 Moth Majors, one Hornet Moth and 1 B.A. Pobjoy-Swallow. *Normal Rates*: Dual, £2 an hour; solo and advanced dual, £1 16s. an hour; solo after 25 hours, £1 10s. an hour; long-period hire by arrangement.

OXFORD.—WITNEY AND OXFORD AERO CLUB, Witney, Minster Lovell, Oxon:—*Fleet*: D.H. Cirrus and Gipsy Moths. *Normal Rates*: Dual, £1 17s. 6d. an hour; solo, £1 10s. an hour; contract rate (50 hours' flying), £1 an hour; special courses for W/T, G.E.'s and "B" licences.

PERTH.—STRATHTAY AERO CLUB, Perth Aerodrome, Scone:—*Fleet*: 1 Avro Avian (another machine expected shortly). *Normal Rates*: Dual and advanced dual, £2 an hour; solo, £1 10s. an hour.

PLYMOUTH.—PLYMOUTH AND DISTRICT AERO CLUB, Roborough, Plymouth:—*Fleet*: 1 Gipsy, 1 Moth (Miles Whitney Straight to be delivered; other types in due course). *Normal Rates*: Dual and solo up to "A" licence, £2 and £1 10s. an hour respectively; advanced dual, £2 5s. an hour; solo, £1 15s. an hour. *Special Rates*: Prepaid: solo from £1 7s. 6d. an hour for 5 hours' flying to £1 13s. 6d. an hour for 25 hours' flying; 15 minutes' free flying for every 5 hours' flying carried out in the normal course of events, 3 hours' solo flying for "A" licence renewal, £1 an hour.

PORTSMOUTH.—PORTSMOUTH AERO CLUB, LTD., The Airport, Portsmouth:—*Fleet*: 2 Gipsy I Moths and 1 Moth Major (1 Miles Hawk shortly to be acquired). *Normal Rates*: Dual, £2 an hour; solo, £1 10s. an hour; blind-flying instruction, £2 5s. an hour; night flying, £4 an hour. *Special Rates*: £1 7s. 6d. an hour for more than 10 hours' flying in a year; £1 5s. 6d. an hour for more than 50 hours' flying in a year.

RAMSGATE.—THANET AERO CLUB, Ramsgate, Kent:—*Fleet*: 1 D.H. Hornet Moth (Miles Whitney Straights to be used in due course). *Normal Rates*: Dual and solo up to "A" licence, £2 and £1 10s. an hour; advanced dual, £2 5s. an hour; solo, £1 15s. an hour. *Special Rates*: Prepaid solo, from £1 7s. 6d. an hour for 5 hours' flying, to £1 13s. 6d. an hour for 25 hours' flying; 15 minutes' free flying for every 5 hours' flying carried out in the normal course of events; 3 hours' solo flying for "A" licence renewal, £1 an hour.

READING.—READING AERO CLUB, LTD., The Aerodrome, Woodley, Berks:—*Fleet*: Miles Hawk Majors. *Normal Rates*: Dual and solo, £2 16s. an hour.

REDHILL.—REDHILL FLYING CLUB, LTD., Redhill Aerodrome, Surrey:—*Fleet*: 5 Gipsy Moths, 1 C.30 Autogiro, 1 Fox Moth, 2 Puss oths, and 1 Segrave Meteor (twin-engined). *Normal Rates*: Dual and solo on Moths, £2 an hour; dual and solo on Autogiro, £2 10s. an hour; solo on Fox Moth, £2 an hour; dual and solo on Puss Moths, £3 and £2 10s. an hour respectively; dual and solo on Meteor, £5 15s. and £5 an hour respectively; blind-flying instruction, £2 10s. an hour. *Special Rates*: After 50 hours' solo on Moths, £1 15s. an hour; after 50 hours' solo on Autogiro, £2 5s. an hour.

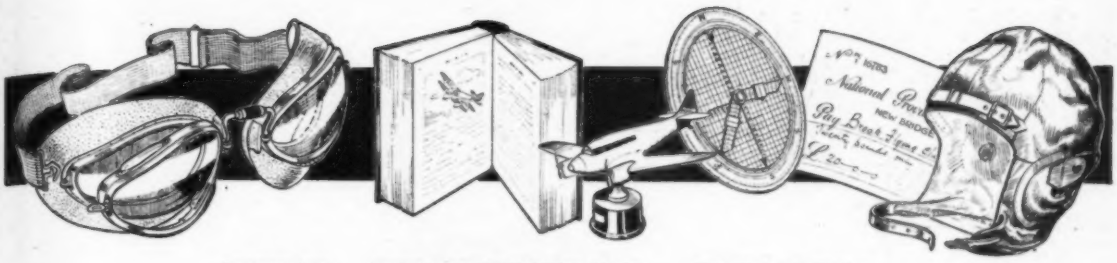
SALISBURY.—WILTSHIRE SCHOOL OF FLYING, LTD., High Post, Salisbury, Wilts:—*Fleet*: 3 D.H. Moths and 1 Desoutter. *Normal Rates*: Dual, £2 an hour; solo, £1 10s. an hour; contract rate (50 hours' flying), £1 5s. an hour.

SHEFFIELD.—SHEFFIELD AERO CLUB, LTD., Nether Thorpe, Worksop, Notts:—*Fleet*: 3 D.H. Moths and 1 Avro Avian. *Normal Rates*: Dual, £2 an hour; solo, £1 12s. 6d. an hour.

SHERBURN.—YORK COUNTY AVIATION CLUB, LTD., The Aerodrome, Sherburn-in-Elmet. Yorks:—*Fleet*: 3 Avro Cadets. *Normal Rates*: Dual and solo up to "A" licence, £2 5s. an hour; dual and solo after obtaining licence, £1 15s. an hour.

SOUTHAMPTON.—AIR SERVICE TRAINING, LTD., Hamble, Sherburn:—*Fleet*: 20 Avro Cadets, 3 Avro Tutors, 2 Avro Avians, 1 Avro 626, 1 Avro Five (three-engined), 3 Saro Cutty Sarks, 4 A. W. Atlas, 1 Percival Vega Gull, 1 Tiger Moth, and 1 Autogiro. *Normal Rates*: These depend on the types used and on the course taken; they are available on application to the Commandant.

(*Concluded on page 276.*)



THE FINISHING TOUCH

A Brief Survey of Some Aircraft Accessories and Personal Equipment of Interest to the Private Owner

INEVITABLY the number of light aircraft gadgets is increasing, although the private owner is not called upon to cope with the appalling profusion of dials and levers which sprout from every nook and cranny in the cockpit of modern Service types.

Luckily the motor car has made us gadget conscious and it is the delight of many flying enthusiasts to equip their machines with such devices as will make for convenience in operation or expand their sphere of usefulness.

Just which instruments are indispensable is, to a great extent, debatable, depending largely on the use to which a machine is to be put. There is, however, a certain minimum complement of dials necessary for every dashboard be it of the minutest lightweight or the rich man's aerial carriage. These should tell him whether his aeroplane and engine are operating within safe limits.

A well-nigh essential trinity of dials common to the dashboard of every aeroplane comprises A.S.I., revolution counter (or tachometer if you will) and altimeter. Well-tried instruments of this nature are specialities of Smith's Aircraft Instruments, of Cricklewood, London, N.W.2, and Short and Mason, Ltd., whose Aneroid Works are in London, E.17.

Navigational

A.S.I., rev counter and tachometer suffice for circuits of the aerodrome on tranquil summer days, but aspiration toward cross-country travel demands some navigational aids.

British pilots may be thankful that there is available to them a number of "lines" in compasses to meet every requirement. A ubiquitous model is the Husun Mk. IIIa handled by Smiths. Other favourites are the Sestrel (a Short and Mason offering), and the comprehensive series marketed by Kelvin, Bottomley and Baird, Ltd., of 18, Cambridge Street, Glasgow, Scotland.

The very best compass has its idiosyncrasies and supplementary instruments are frequently mounted to indicate small departures from a set course. Depending for their actuation on a gyroscope which always tends to retain the position it held when set in motion, these instruments, although originally designed as auxiliary navigational aids, have lately come within the province of blind-flying instruments for assistance when ground and horizon are obscured. They tell the pilot whether he is holding his course, but they do not indicate undesirable side slipping. Such an indication is the function of a bank indicator, from which the pilot can note not only departures from an even keel but can gauge whether a turn of any given radius is correctly banked. Bank indicators, if not dependent on a gyroscope embody a pendulum geared to a pointer. It is common practice to embody both turn and bank indicators in a single instrument.

Well established manufacturers of turn and bank indicators are Reid and Sigrist, Ltd., of New Malden, Surrey (this firm, in addition to their Service-type instruments make the comparatively cheap Gyorizon), Smith's Aircraft Instruments, Short and Mason, Cooke, Troughton and Simms, of York, and the Williamson Manufacturing Co., Ltd., of Willesden, London, N.W.10.

The Sperry Gyroscope Co., Ltd., whose works are on the Great West Rd., Brentford, Middlesex, are specialists in "free" gyroscopic instruments which indicate changes in altitude in relation to the axis of the gyro. Sperrys are offering an "artificial horizon" and "directional gyro."

For dashboard or personal wear a clock by Mechanisms or a watch by G. and M. Lane and Co., Ltd., 24 and 26, Ludgate Hill, E.C.4, fill the bill.

The automatic pilot, definable as a device which controls an aircraft independently of human assistance, is to be found on most of the newest transport machines, and, although an expensive item, is likely to find increasing popularity among the more pecunious private owners. Automatic pilots are produced by the Sperry Gyroscope Co., Ltd., Smith's Aircraft Instruments, and P.B. Deviators, Ltd., of Croydon, Surrey.

Drift sights are acceptable accessories on flights of any length, and can be obtained from Smith's and Short and Mason.

Enthusiasm is growing for the Simmonds Goudime course and distance calculator marketed by Simmonds Aerocessories, Shell-Mex House, London, W.C.2.

Once the aerial touring germ gets a hold on the system the victim usually goes in search of night flying equipment. He may fit his aeroplane with a red light to port, a green one to starboard, and a white light visible from astern, or he may mount a combination of all three at some central point. Such a tri-colour combination is the "Demec," made by Mechanisms, of George Street, Croydon. Then, if his peregrinations take him into undeveloped regions where night landing facilities are not available, he may want some flares, which he may buy from Y.S.C., Ltd., of 13, Thavies Inn, London, E.C.1, who will also supply him with lights for his Very pistol which he may have acquired from Webley and Scott, of Weaman Street, Birmingham. Our enthusiast will be tempted further by the admirable landing lights sold by Vickers Armstrongs, Smith's and F. J. A. Cameron, of 2, John Street, London, W.1, and Mechanisms, of Croydon.

A great deal of the electrical equipment mounted on modern privately owned aircraft is produced by Rotax, Ltd., of Willesden Junction, London; B.T.H., Ltd., of Rugby; D. H. Bonella and Son, Ltd., of 46-48, Osnaburgh Street, London, N.W.1, and the General Electric Co., Ltd., Magnet House, Kingsway, W.C.2. Accumulators are obtainable from Peto and Radford, 50, Grosvenor Gardens, London, S.W.1, and the Chloride Electrical Storage Co., Ltd., of Manchester.

The great majority of private-owner aircraft to-day are fitted as standard with brakes, but should a modernist find himself brakeless let him repair to Bendix, Ltd., Tyseley, Birmingham, the Dunlop Rubber Co., St. James Street, London, The Palmer Tyre, Ltd., Thames House, Millbank, London, S.W.1, or Vickers Aviation, Ltd., Vickers House, Broadway, Westminster.

Radio

The compleat private owner will doubtless covet two-way radio equipment, although considerable benefit may be derived from a receiver alone, particularly if equipped with a homing attachment. So far there has been little standardisation of radio equipment, but the Plessey Co. (whose sales are handled by R.T.E., Ltd., 111, Charing Cross Road, London, W.C.2), Standard Telephones and Cables, Ltd., of Aldwych, London, Marconi's Wireless Telegraph Co., Electra House, London, W.C.2, and Transreceivers, Ltd., of 444, Ewell Road, Surbiton, Surrey, have developed a wide selection of appropriate sets.

Clothing and items of personal equipment can be viewed and acquired at a number of establishments, notably at Airco, Ltd., 3, St. James's Square, London, S.W.1; D. Lewis, Ltd., 124, Great Portland Street, London, W.1; S. Lewis, 27, Carburton Street, London, W.1; Marble Arch Motor Supplies, 133 and 135, Edgware Road, London, W.2; Moss

Bros. and Co., Ltd., Covent Garden, London, W.C.2; Burch's, Bedford Street, London, W.C.2; Burberrys, Ltd., Haymarket, London, S.W.1; Fulcher and Co., 21, Savile Row, London, W.1; Gieves, Ltd., 21, Old Bond Street, London, W.1; and Alkit, Ltd., Cambridge Circus, London, W.C.2. Goggle specialists are E. B. Meyrowitz, Ltd., 1a, Old Bond Street, London, W.1, and the Triplex Safety Glass Co., 1, Albemarle Street, London, W.1.

Our private flyer will feel all the more at ease if he specifies a fire extinguisher made by any of the following concerns: Smith's Aircraft Instruments, Cricklewood, London; the Pyrene Co., Ltd., Brentford, Middlesex; General Fire Appliance Co., Ltd., 11, Queen Victoria Street, London, E.C.4; National Fire Protection Co., Ltd., Petersham Road, Richmond, Surrey, and Auto Fire Protection, Ltd., Abford House, Wilton Road, London, S.W.1.

Depending on psychology, he may welcome a parachute, available in a number of patterns from the Irving Air Chute of Great Britain, Ltd., Letchworth, Herts, the G.Q. Parachute Co., Ltd., 17, Stoke Road, Guildford, Surrey, or the Pak Parachute Co., Ltd., 175a, Streatham Road, Mitcham.

And yet something may be lacking: possibly a loose seat cushion as made by David Moseley and Sons, Ltd., of Ardwick, Manchester, or the Dunlop Rubber Co., Ltd.

FIRST STEPS into the AIR

(concluded from page 270)

Some small experience of aerobatics may also be included in the training and the functions are taught early in order to give a secure and natural feeling to the pilot in whatever position he may find himself either by accident or intent. Before his first solo he will have practised, and may or may not have enjoyed, spinning. The engine is shut down but the nose held up until the machine is stalled. The controls become "sloppy" and a feeling of being very precariously balanced is experienced. The stick is now held right back and full rudder put on to one side or other; viciously, it seems, the aeroplane goes into the spin, and continues to spin until the rudder is centralised, or reversed, and the stick eased forward.

The loop is pleasant and easily carried out. The nose is put down to pick up the necessary speed, care being taken not to over-rev the engine. It is then allowed to rise and the throttle is opened wide, the stick is eased progressively backwards until the horizon comes into view again, when the engine is cut and the loop is finally completed by pulling out from the dive. Like all other manœuvres outside the plain flying, once done without assistance a loop seems simple and quite normal. Lastly, a word on the formalities of securing one's "A" licence, an achievement which to too many people (so the club instructors tell us) is the be-all and end-all of learning to fly, whereas it should be the "Open, Sesame" to many good years.

The tests for the "A" fall into three sections: (1) *Viva voce* examination on rules and orders. (2) Medical examination. (3) Flying test. The *viva voce* consists of a number of questions regarding air navigation rules, which cover a multitude of things.

This examination and the flying test will be carried out by an official observer from the Royal Aero Club; most clubs have one or more officials who are observers. The flying test consists of a series of five figure-of-eight turns carried out under observation and at a barograph-registered constant height, and a spot landing from a height of 2,000 ft. A report of this test and examination, proof in a log book of at least three hours' solo flight, including the test, two mounted portraits of the applicant, and the fee of £1 1s. must now be forwarded to the Royal Aero Club, who will then issue their certificate of ability to fly an aeroplane. In the meantime a copy of C.A. Form 61 and C.A.2a must be obtained from the Air Ministry; the former is taken to one's qualified medical attendant, who will carry out the examinations laid down and record the results, forwarding them directly to the Air Ministry. The latter, a simple application for an "A" licence, is filled in and sent, together with the R.Ae.C. Certificate, three unmounted portraits of the pupil, his log book, and the fee of 5s. to the Secretary (D.G.C.A.), Air Ministry, Gwydyr House, Whitehall, London, S.W.1.

In a few days the coveted "ticket" will arrive, and will be valid for one year from the date of issue. Thereafter, a renewal form must be completed and dispatched with the log book, which must show at least three hours' solo flight during the preceding year.

For many people one of the main problems concerns the cost of flying tuition. In the summary below, therefore, average complete costs are given for each item in the process of acquiring an "A" licence:

Helmet, 10s. 6d. to £1 1s.
Goggles, 10s. 6d. to £1 1s.
Royal Aero Club fees, £1 1s.
Air Ministry fees, 5s.
Medical examiner's fees, 10s. to £1 1s.
Flying instruction (about 13 hrs.), £25 to £30.

To this should be added an adequate sum to cover the cost of handbooks, postage and fares. Club membership is generally of the order of £3 3s. per year, probably with an entrance fee of £1 1s. or more. Solo flying rates vary between 25s. and £2 5s. an hour.

It may be said, in summing up, that to fly is easy, to fly safely is easy provided that the rules are obeyed and instructions remembered, and that to fly well needs a great deal of practice.

CAVALCADE of the CLUBS

(concluded from page 274)

HAMPSHIRE AEROPLANE CLUB, Southampton Airport, Eastleigh, Southampton:—*Fleet*: 4 Gipsy Moths, 1 Moth Major and 1 Leopard Moth. *Normal Rates*: Dual, £2 an hour; solo up to 10 hours, £1 15s. an hour; solo after 10 hours, £1 10s. an hour; blind-flying instruction, £2 10s. an hour. *Special Rates*: Reduction of 2s. 6d. an hour when £25 is deposited; other special rates for "B" licence pupils.

STOKE-ON-TRENT.—NORTH STAFFORDSHIRE AERO CLUB, Meir, Stoke-on-Trent:—*Fleet*: 2 Miles Hawks and one Hillson Praga. *Normal Rates*: "A" licence dual and solo, £1 17s. 6d. an hour; later solo, £1 7s. 6d. an hour.

WALSALL.—SOUTH STAFFS AERO CLUB, Aldridge Road, Walsall, Staffs:—*Fleet*: 2 Avro Avians. *Normal Rates*: Dual, £2 5s. an hour; solo, £1 15s. an hour. Special rates for long-period hire.

WORCESTER.—WORCESTERSHIRE FLYING SCHOOL, Tilesford, Pershore, Worcs:—*Fleet*: 2 D.H. Moths (another machine added during the summer months). *Normal Rates*: Dual, £2 an hour; solo, £1 10s. an hour. Special rates for "B" licence and instructor's courses.

YAPTON.—YAPTON AERO CLUB, LTD., Ford, Sussex. *Fleet*: 4 Cirrus II Moths and 1 Gipsy II Spartan. *Normal Rates*: Dual, £2 an hour; solo, £1 12s. 6d. an hour.

YORK.—YORK AND LEEMING FLYING CLUB, Municipal Aerodrome, York:—*Fleet*: 4 Gipsy I Moths, 1 B.A. Swallow, 1 Miles Hawk, and 1 Puss Moth. *Normal Rates*: Dual and solo, £2 an hour; special contract rates down to £1 2s. 6d. an hour. Also at Leeming, near Northallerton.

HIRE SERVICES.—AIR HIRE, LTD., Heston Airport, Middlesex:—*Fleet*: D.H. Leopard, D.H. Hornet, D.H. Puss, and B.A. Eagle. *Normal Rates*: £5 5s. daily, or £4 10s. daily for three or more days, with Leopard and Eagle; £4 15s. daily, or £4 4s. daily for three or more days, with Hornet and Puss. For 28-day periods the charges are: Eagle, £115; Leopard, £110; Hornet, £105, and Puss, £100. These charges include insurance. Small extra charge for touring abroad. Short-period hire for all machines, £2 10s. an hour, including insurance, fuel and oil.

AIR TRAVEL, LTD., Gatwick Airport, Horley, Surrey:—*Fleet*: Gipsy I Moths. *Normal Rates*: £2 10s. a day, or £2 a day for four or more days, other than Saturdays, Sundays and holidays. Additional charge of 10s. a day for foreign touring. These charges include insurance. A machine is also available at Walsall aerodrome.

PHILLIPS & POWIS AIRCRAFT, LTD., Woodley Aerodrome, Reading, Berks:—*Fleet*: 1 Miles Hawk Major and 3 Miles Falcons. *Normal Rates*: Hawk, £4 a day, £3 a day for three or more days; Falcon, £5 5s. a day, £4 10s. a day for three or more days. These charges include insurance for the British Isles and Europe. Short-period hire: Hawk, £2 16s. an hour, Falcon £3 an hour.

AIR RACING for the AMATEUR

In this Practical Article C. E. Gardner (Winner of the 1936 King's Cup) Reviews an Important Aspect of Private Flying, and Gives Many Useful Tips to Those with Little or No Experience of Racing

Mr. C. E. Gardner receiving the King's Cup from Lord Swinton at Hatfield last year. In the other view his Vega Gull is being refuelled during the race.
(*Flight* photographs.)

BEFORE starting these notes I should like to point out that they are not intended to be of any help to those people who race regularly, but rather to those who have little or no previous racing experience and are, perhaps, wondering whether it is worth their while entering for some of the events this coming summer.

Many private owners believe that racing is a pastime solely for those with unlimited free time and an inexhaustible banking account. There might perhaps be some truth in this if the England-to-Australia and England-to-South Africa races were being considered, but it is very far from being the case with our Home events, in which courses varying from 20 to 1,300 miles are flown by aircraft with engines of usually not more than 200 total b.h.p.

In this case no expensive preparation work is necessary, as all local British races are run on a handicap basis, so that the man who enters a standard aircraft will have almost as much chance as the man who spends weeks or pounds streamlining his machine to the nth degree. The word "almost" is used because the speed of the former's machine is known fairly accurately, while the latter has the sporting chance that his aircraft may be faster than the handicappers calculate. There are usually, however, some things which can be done to the machine to improve the performance without altering it from standard. If the owner has not the time, the experience or the facilities to do the work himself, then any licensed ground engineer will do it, and should not have to spend more than a day on the airframe to get it ready for the whole season. The engine will require nothing more than a 25-hour schedule or a check over before each race provided the compressions are good. The modern aero engine is built so robustly and runs with such magnificent reliability that 20 to 25 hours at full throttle per year has no noticeable effects. It only means that the first complete overhaul may have to be carried out slightly sooner—say, at 600 hours instead of 750—if the owner has had two years' use out of it.

THE author needs no introduction to those who regularly attend air races. Last July, flying a Percival Vega Gull entered by Sir Connop Guthrie, he won the King's Cup Race at an average speed of 164.47 m.p.h. His first racing success was the Yorkshire Club's Trophy in 1933, taken with an Avro Cadet, and in 1935 he won the Siddeley Trophy in the King's Cup Race. He also has a great deal of long-distance flying to his credit, including European tours, a trip to India with a Short Scion, and a tour of America. He at present owns three aeroplanes—a Comper Swift, a Miles Whitney Straight and a Beechcraft—which he operates from his private aerodrome at Warlingham, Surrey.

The additional cost of racing, therefore, resolves itself into the following:—

(1) Entry fee for each race, varying from one guinea for the smaller races to ten guineas for the King's Cup.
(2) Preparation of machine.
(3) Cost of maps (if required).
(4) Fuel and oil (for all races except King's Cup).
(5) Insurance.

For the King's Cup a free set of sparking plugs is usually provided by the manufacturers you choose, and free fuel and oil are supplied by oil companies—together with generous bonuses to the owner fortunate enough to win.

Normally, there are about a dozen races for which the owner can enter during the season. Quite apart from the possibility of being able to make the game pay, a great deal of enjoyment can be had in matching one's skill against others and, at the end of the race, comparing notes on the results obtained and conditions experienced. The tension and general air of enthusiasm are well worth the cost of entering, and each particular race will be remembered for years afterwards by the incidents involved and types entered. The thrill of overtaking a machine of similar

type, due to better preparation or better navigation and handling, is worth hundreds of hours of normal touring.

The dates of the various races can be found by studying the aviation calendar in *Flight*. Write for entry forms well beforehand and fill them in carefully; it is most irritating to the handicappers to find that a machine does not appear for the race in exactly the same form in which it was entered, and is apt to lead to disqualification.

* * *

Good maps which are easy to handle (especially in an open cockpit) are of the utmost importance if one is flying without a navigator. For a particularly important race, such as the King's Cup, it is well worth while to obtain a specially prepared set from the A.A., Stanford's, or any other well-known map firm. Alternatively, the ¼in.-to-one-mile sheets can be bought from the Stationery Office and cut and pieced together by oneself. A strip nine to ten inches wide with the track running down the centre is the usual size. Mark ten-mile distances from each turning point back to the one before it; some people do it the other way round, while others mark it both ways. Personally, I prefer to work out my ground speed by measuring with a rule and timing any convenient points passed over, and then use my marked distances for obtaining an estimated time of arrival at the next turning point. This will prove invaluable if a patch of low cloud is met and one is forced to go up into it (the Waddington leg of the 1934 King's Cup comes to mind). It is not often practicable unless a navigator is carried, but I contend that for a race such as the King's Cup, where a variety of weather conditions is likely to be met on the first day, a navigator is well "worth his keep," as an allowance is always made in the handicap for the additional weight.

"In short pylon races cornering plays an important part. Allow for drift at each corner so that the pylon is always at the centre of the arc flown . . ."

Preparation of the machine is a most important but difficult problem. One must try to make the machine faster than it is normally; on the other hand, it is absolutely useless to declare the machine as standard and then to take off the exhaust manifold or door handles or any other obviously standard feature, as it will give Messrs. Rowarth and Dancy every reason to feel annoyed, and will waste your own time when you have to put them back again.

Take off everything which "sticks out" and which is not standard, particularly venturis for directional gyros, turn indicators and artificial horizons. If the weather forecast is really bad, keep the venturi for the one turn indicator, but the first day of the 1934 King's Cup, already referred to was the only race during the last four years in which I found a turn indicator was really necessary. A directional gyro is a great help when flying on a northerly course, and might perhaps pay its way on a race such as the London-Newcastle if flown on a bumpy day; otherwise, it is not worth the drag of the additional venturi. One year I used a directional gyro and turn indicator from the same venturi, and, apart from a rather quicker precession of the gyro, necessitating more frequent correction with the compass, it worked very well. If this is tried, however, care should be taken to ensure that the speed of the aircraft is enough to give sufficient vacuum. It is unlikely to work well on machines with speeds of under 160 m.p.h., and, of course, is not recommended for touring, as both instruments would go out of action if the machine were cruised slowly under conditions of bad visibility.

Little can be done to the engine other than routine maintenance. If the compressions are at all poor, then the heads should be removed, valves ground in, and valve clearances rechecked after the engine has been assembled and run in the air for an hour or two. The exhaust manifold can be removed and stub pipes fitted, but this will have to be declared on the entry form, so there will probably be little gain in the long run.

An airscrew which will give maximum permissible revolutions in level flight is essential, and should these be exceeded by about 75 r.p.m. or even 100 r.p.m. no harm will be done and a slightly increased speed will probably result. Any increase above this will not help much, as the power curves of most engines begin to get flat at the top. An airscrew of the Fairey Reed type is definitely the most efficient for racing and will always add a few m.p.h. to the top speed. Although they have to be declared on the entry form, most competitors seem to use them. The controllable-pitch type of airscrew will be of

". . . will give Messrs. Rowarth and Dancy every reason to feel annoyed." The two famous handicappers, without whom no air race is complete, in action on the starting line.

value for the take-off, owing to the quicker getaway, but it is of little or no use in increasing the maximum speed.

* * *

For pylon races and very short cross-country events, where there are a number of turning points, it is well worth while going round the course once or even twice beforehand and memorising or jotting down on a piece of paper the salient features to be passed over. One wants to choose a mark on the next course on to which to turn after rounding each pylon, as it is very difficult otherwise to decide the right moment to come out of the turn. For the longer races it is not usually possible to go round beforehand, and by some is considered "not quite the done thing." For these events, therefore, it is most important to go over the maps carefully in advance, seeing, for instance, if any time could be saved by going round a mountain instead of following the track over the top, or whether an alternative valley route would be better than going "up into it" if the clouds were down on the hills.

Filling-up and Starting

Never carry more fuel than necessary, as it only adds weight, which will affect the getaway and maximum speed. Longitudinal loading is also of importance. Normally, the position of the navigator is the only thing which can affect this, and, apart from advice from the designer or test pilot, the best method seems to be to keep the tail trimming gear in about the centre and place the navigator accordingly.

For short sprint races it is of the utmost importance to have the engine developing full power right from the start. To ensure this, some people heat up the oil in boiling water and put it in the tank already hot. This avoids running the engine for a long time beforehand at rather high r.p.m. in order to get the oil warm. Personally, I prefer to run it at 1,000/1,200 r.p.m. for five or seven minutes about twenty minutes before the start, and, when the oil is nicely circulated, shut off the engine until about five minutes before the start. A cylinder head temperature indicator is of great help when warming up—not so much from the point of view of telling when the engine is warm, as the heads reach a constant temperature quite quickly, but rather to avoid over-heating. It is unfortunate that so few, if any, privately owned British aircraft are fitted with this instrument.

For the actual start the usual method seems to be to hold the brake lever (if of the hand type) off the ratchet and have the throttle wide open from the time the starter's ten-second flag is raised. Get the tail up quickly and ease the machine off as soon as possible. If no compulsory turning point has been fixed beforehand at the end of the take-off run, then the turn on to course should be started as soon as it is considered safe. A little practice on an unlicensed or little-used aerodrome will soon make clear to what extent this is possible. It is advisable not to over-do it, as the results are likely to be unpleasant.

* * *

It is not essential, I know, to enlarge upon the necessity for flying low against a head wind and high with a following wind; this is common knowledge to all who fly. There is often difficulty, however, in deciding exactly how low or how high to fly. It frequently happens that when flying against a strong head wind the air close to woods or semi-wooded country is very much rougher than that only 100ft. or so higher. If there is found to be a large difference in bumpiness, then it will often pay to fly somewhat higher in order to keep in the smoother and less turbulent air, in spite of the increase in wind speed. As regards a following wind, care should be taken to ensure that the speed does increase with height sufficiently to make it worth while climbing, and that the direction does not change round enough to make it come on one's beam, or even ahead. Weather reports giving wind speed and direction up to 5,000 ft., used in conjunction with a C.D.C., will soon make it clear as to the best height to fly. Beware of winds between north and south-east, as they frequently lose strength with height, back instead of veer, and turn to westerly winds higher up. The direction is not likely to change completely round, however, at altitudes below 3,000 ft.

The majority of straight courses in England do not exceed 150 miles, and I have found that on aircraft with speeds of about 170 m.p.h. it is seldom of advantage to fly at over 2,500 ft. when using a following wind. Gain height slowly and lose it slowly. A rate of descent of 200 to 300 ft. per min. seems reasonably efficient in practice. A rate-of-climb-and-descent indicator used in conjunction with the distance left to go to the next turning or stopping point will quickly tell one the right moment to start losing height in order to come over the aerodrome at the desired altitude. Here is an example:—

Altitude now flying	2,000 ft.
Desired rate of descent	200 ft. per min.
Speed of aircraft when losing altitude at 200 ft. per min. ...	180 m.p.h.

Therefore time required to descend to 400 ft. $= \frac{(2{,}000 - 400)}{200} = 8$ min.

In 8 min. at 180 m.p.h. one goes 24 miles. Therefore start to lose altitude 24 miles before the turning point. This may look rather a lot to bother about, but in practice it can be carried out with a slide rule or in one's head in a few seconds.

If the next course is up-wind, time it to come right down low for the turn. If it is again down-wind, then come down only to the minimum height required by the regulations for identification purposes.

Cornering Round Pylons

In short pylon races cornering plays an important part. Allow for drift at each corner so that the pylon is always the centre of the arc flown; in strong winds it needs a lot of concentration and good judgment to achieve this, and is well worth a little practice beforehand. Naturally, the larger and faster the aeroplane the wider the turn necessary. In an acute-angled turn make it fairly steep, but avoid forcing the machine round too much on the elevators. Much can be learnt by watching a few races from the ground and observing the different methods of cornering. A very slight dive after straightening out helps to regain the little speed lost, and, if necessary, the height may be regained very slowly after the speed has been picked up. Always nurse the machine along as if beating a yacht to windward; do not correct the bumps too hurriedly. Modern aircraft with speeds approaching 200 m.p.h. take quite a long time to work up to their ultimate top speed; care should be taken, therefore, to avoid any disturbing or slowing-down influence due to coarse handling.

Though I seem to have dealt with a fair number of points, it is needless to say that only actual experience can teach the soundest methods in individual cases—which, nevertheless, does *not* mean that racing is only for the tough, dyed-in-the-wool experts with hundreds of hours' flying behind them.

BOOKS FOR THE ROAD USER

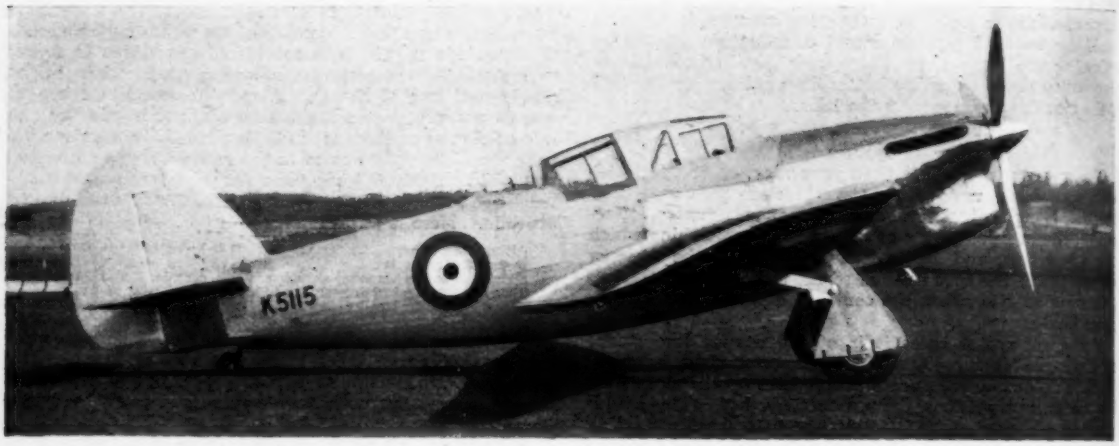
TWO most useful little books for the road-user are published by Iliffe and Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. They are *The Autocar Guide for the L Driver* (1s. 2d. by post) and *Two-Stroke Motor Cycles* (2s. 3d. by post), which latter book is now appearing in its sixth edition.

The *Guide for the L Driver* forearms the novice by forewarning him or her of every difficulty that may be experienced and by giving advice in the way to avoid them. The more difficult points in driving instruction are explained and numerous small diagrams make more clear the points raised.

This two-stroke book deals simply and thoroughly with the two-stroke motor cycle, its engine and components, and riding and equipment.

THE ROYAL AIR FORCE

SERVICE NOTES AND NEWS — AIR MINISTRY ANNOUNCEMENTS



FOR RAPID RAIDS: The Hawker light bomber with 1,000 h.p.—plus Rolls-Royce Merlin engine. There is a marked resemblance to the Hurricane. Points to note are the "belly" for the bombs and the D.H. v.p. airscrew. (*Flight* photograph.)

H.R.H. THE DUKE OF KENT

His Majesty The King has been graciously pleased to approve the appointment of His Royal Highness George Edward Alexander Edmund Duke of Kent, K.G., K.T., G.C.M.G., G.C.V.O., to be a Group Captain in the Royal Air Force.

NEW DIRECTOR OF SIGNALS

The Air Ministry announces the appointment of Air Comdre. Charles William Nutting, O.B.E., D.S.C., to be Director of Signals, Air Ministry, on April 1, 1937, *vice* Air Comdre. James Bevan Bowen, C.B.E.

R.A.F. VOLUNTEER RESERVE—OVER 800 PILOTS REQUIRED

The Air Ministry announces:—

Arrangements have been completed for the entry of personnel for training as pilots at twelve aerodrome centres in the recently created Royal Air Force Volunteer Reserve, and for training to begin early in April. The total number of entrants required during the next twelve months is not less than 800. Applications are invited immediately from candidates resident in or near the following places for training at the aerodromes shown:—

Place.	*Aerodrome*
Bristol	Filton
Coventry	Ansty
Glasgow	Prestwick
Hull	Brough
Leicester	Desford
London	Hanworth, Hatfield and White Waltham
Northampton	Sywell
Perth	Perth
Southampton	Hamble
Swindon	Yatesbury

Candidates must be between their 18th and 25th birthdays, be physically fit and have had an education up to the standard of the School Certificate, or the Leaving Certificate in Scotland. Previous flying experience is not necessary. Applications should be sent to the Secretary, Air Ministry (S.7.c), Kingsway, London, W.C.2, but it is contemplated that in the majority of cases local selection boards will be practicable.

Selected candidates will be enlisted as airman pilots with the rank of Sergeant; later they will have opportunities of promotion to commissioned rank on merit. The initial period of service will be five years and pilots will have the opportunity of extending their service at the end of that period. Training will be available at week-ends and at other times, including evenings, where this is practicable. Flying training will be given at the aerodromes and ground training at town centres centrally situated in the various places mentioned. Candidates must be able and willing to attend for training at week-ends and in the evenings. They will also be required to attend for 15 days' continuous training annually at times which, as far as possible, will be arranged to suit the convenience of individual pilots. In this connection the Air Ministry would emphasise that the success of this scheme will depend in a great measure on the good will and co-operation of employers who can do much to facilitate the attendance of volunteers for training.

Provided they carry out the training required of them, pilots will receive a retaining fee of £25 a year. Pay and allowances will be given for periods of continuous training and an allowance to cover out-of-pocket expenses at other times. Travelling expenses will be refunded.

The Air Ministry contemplates the opening of aerodromes and town centres in a number of other districts. Announcements will be made from time to time as soon as it is possible to consider applications from these additional areas.

No. 11 FLYING TRAINING SCHOOL

The undermentioned officers have been awarded special assessments at No. 11 Flying Training School, Wittering:—

Distinguished Pass

A.P/O.s P. H. Alington and J. Ellis.

NO. 2 FLYING TRAINING SCHOOL

The undermentioned officer and airmen have been awarded special assessments on completion of a course of flying training at No. 2 Flying Training School, Digby:—

Special Distinction

A./P/O. J. F. Grey.

Distinguished Pass

A./Sgts. Garrod, A. E., Jones, W. T., and Moores, L. G.

FLYING ACCIDENT

The Air Ministry regrets to announce that F/O. Kenneth Northcote Lees lost his life and A/C.1 Frederick Atkinson was slightly injured as the result of an accident which occurred at Tanai, near Wana, India, on March 11, to an aircraft of No. 5 (Army Co-operation) Squadron, Chaklala, Rawalpindi, Punjab. F/O. Lees was the pilot of the aircraft and A/C.1 Atkinson the passenger.

ROYAL AIR FORCE CLUB

The annual general meeting of the Royal Air Force Club will take place at 6 p.m. on Wednesday, March 24, 1937.

BOYS WANTED

The Air Ministry announces that the expansion of the Royal Air Force continues to require the entry of well-educated boys in large numbers, and more than 1,500 will be entered in the summer of 1937, of these approximately 1,250 will be needed in August for training as aircraft apprentices, and nearly 300 in September as boy entrants. No previous trade experience will be necessary.

Applicants for apprenticeships must be at least fifteen but under seventeen years of age on August 1, 1937, and for entry as boy entrants between 15¾ and 17¼ on September 1, 1937. Full particulars of both schemes (A.M. Pamphlet 15 and A.M. Pamphlet 54 respectively) may be obtained from the Inspector of Recruiting, Royal Air Force, Victory House, Kingsway, W.C.2.

THE CORONATION

The Air Ministry announces that a limited allotment of seats on Government stands has been made available for the use of serving officers and airmen and retired officers of the Royal Air Force and their friends. The allocation will be by ballot.

Officers, airmen and civilians in the three following categories will be eligible to apply:—(a) Officers and airmen on the active list of the Regular Air Force; Auxiliary Air Force officers and airmen; members of Princess Mary's Royal Air Force Nursing Service; civilians at outstations; members of the Observer Corps; officers of the Special Reserve and Auxiliary Air Force Reserve of Officers. (b) Officers of the Reserve of Air Force Officers. (c) Retired Officers of the Regular Air Force; Retired members of Princess Mary's Royal Air Force Nursing Service.

The price of seats in uncovered stands is 15s. each; there are also a few covered stands in which the seats are priced at 22s. 6d. No money should be sent with the applications.

ROYAL AIR FORCE GAZETTE

London Gazette, March 9, 1937

General Duties Branch

Flt. Lt. J. W. B. Judge is placed on the half-pay list, Scale B, from February 12 to 27 inclusive; F/O. T. G. Young is restored to full pay from half-pay (March 3); Lt.-Cdr. E. H. Shattock, R.N., is reattached to the Royal Air Force as a Flight Lieutenant with effect from February 26 and with seniority of April 1, 1935.

PRINCESS MARY'S ROYAL AIR FORCE NURSING SERVICE

Sister Miss M. H. Duff resigns her appointment (March 12).

ROYAL AIR FORCE RESERVE

Reserve of Air Force Officers

General Duties Branch

Acting Pilot Officer on probation R. H. Weston is confirmed in rank and graded as Pilot Officer (January 27); F/O. R. F. Bulstrode is transferred from Class AA (ii) to Class C (November 5, 1936); the notification in the *Gazette* of August 25, 1936, concerning F/O. R. A. Beynon is cancelled.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Air Vice-Marshal.—L. A. Pattinson, D.S.O., M.C., D.F.C., Headquarters, No. 23 (Training) Group, Grantham; on appointment as Air Officer Commanding, 5.3.37.

Air Commodores.—C. D. Breese, C.B., A.F.C., to Headquarters, No. 17 (Training) Group, Lee-on-the-Solent; on appointment as Air Officer Commanding, 5.3.37. A. G. R. Garrod, O.B.E., M.C., D.F.C., to Headquarters, Armament Group, Eastchurch; on appointment as Air Officer Commanding, 27.2.37.

Group Captain.—F. H. M. Maynard, A.F.C., to No. 23 (Training) Group, Grantham; for duty as Senior Air Staff Officer, 16.2.37.

Wing Commanders.—S. S. Benson, A.F.C., to Headquarters, R.A.F., Iraq, Hinaidi; for Equipment (Engineer) Staff Duties, 2.3.37. F. H. Laurence, M.C., to R.A.F. Station, Southampton; to command, 1.3.37. J. M. Mason, D.S.C., D.F.C., to R.A.F. Station, Gosport; for Administrative duties, 22.2.37.

Squadron Leaders.—A. R. M. Rickards, O.B.E., A.F.C., to Headquarters, R.A.F., Iraq; for Air Liaison duties, Bahrein, 2.3.37. F. G. S. Mitchell, to Headquarters, R.A.F., Middle East, Cairo, Egypt; for Air Staff (Armament) duties, 8.2.37. J. G. Hawtrey, to Headquarters, R.A.F., India; for course at Staff College, Quetta, 20.2.37. M. B. Mackay, to No. 4 Armament Training Camp, West Freugh; for flying duties, 26.2.37. L. W. Dickens, to No. 139 (Bomber) Squadron, Wyton; to command, 22.2.37. V. S. Parker, D.F.C., A.F.C., to No. 63 (Bomber) Squadron, Upwood; to command, 22.2.37.

Flight Lieutenants.—W. D. J. Michie, to R.A.F. Station, Kalafrana, Malta, 2.3.37. W. E. Rankin, to No. 269 (General Reconnaissance) Squadron, Abbotsinch, 25.2.37. R. J. Clare-Hunt, to Headquarters, R.A.F., Middle East, Cairo, Egypt; for duty as Personal Assistant to Air Officer Commanding, 8.2.37. H. H. Chapman, to No. 4 (Army Co-operation) Squadron, Odiham, 22.2.37.

Flying Officers.—V. J. Casey, to R.A.F. Depot, Aboukir, Egypt, 2.3.37. D. F. Dixon, Headquarters, Fighter Command, Stanmore; for duty as Personal Assistant to Air Officer Commanding-in-Chief, 22.2.37.

Pilot Officers.—C. E. Levitt, to No. 21 (Bomber) Squadron, Lympne, 26.1.37. F. J. L. Donaldson, A. L. H. Solano, to No. 34 (Bomber) Squadron, Lympne, 26.1.37.

Acting Pilot Officer.—S. F. Coutts-Wood, to No. 21 (Bomber) Squadron, Lympne, 26.1.37. R. V. Evers-Swindell, A. W. Oldroyd, to No. 3 (Fighter) Squadron, Whyteleafe, 21.2.37. E. C. Mesurier, to No. 18 (Bomber) Squadron, Upper Heyford, 21.2.37. G. A. Roden, E. W. Sykes, to No. 29 (Fighter) Squadron, North Weald, 21.2.37. C. G. S. Robinson, to No. 35 (Bomber) Squadron, Worthy Down, 21.2.37. J. W. B. Vernon, to No. 83 (Bomber) Squadron, Turnhouse, 21.2.37. C. L. Haddon, C. E. Harris, C. S. Kemp, to No. 101 (Bomber) Squadron, Bicester, 21.2.37. H. P. Powell, G. H. Stephens, to No. 104 (Bomber) Squadron, Hucknall, 21.2.37. H. B. Lightoller, B. A. Sisson, P. E. Warne, to No. 107 (Bomber) Squadron, Andover, 21.2.37. J. A. F. Mertens, G. W. Parsons, H. C. Sammels, to No. 114 (Bomber) Squadron, Wyton, 21.2.37. T. D. M. Macdonald, to No. 139 (Bomber) Squadron, Wyton, 21.2.37. J. R. Hollington, D. G. Perry, to No. 224 (General Reconnaissance) Squadron, Boscombe Down, 21.2.37. W. W. Campbell, P. H. Leyton, E. C. Lilburn, C. S. Thomas, B. B. Wilmott, to No. 269 (General Reconnaissance) Squadron, Abbotsinch, 21.2.37. M. H. Brown, to No. 1 (Fighter) Squadron, Tangmere, 21.2.37. B. R. Whaley, to No. 25 (Fighter) Squadron, Hawkinge, 21.2.37. C. H. Boxall, W. W. Macfarlane, to No. 40 (Bomber) Squadron, Abingdon, 21.2.37. E. L. Shankland, to No. 46 (Fighter) Squadron, Kenley, 21.2.27. R. A. Milburn, K. R. Russell, to No. 54 (Fighter) Squadron, Hornchurch, 21.2.37. R. T. Collier, to No. 57 (Bomber) Squadron, Upper Heyford, 21.2.37. P. P. Troughton-Smith, C. S. F. Wood, to No. 103 (Bomber) Squadron, Andover, 21.2.37. E. C. Cathels, to No. 111 (Fighter) Squadron, Northolt, 21.2.37. T. C. Weir, to No. 139 (Bomber) Squadron, Wyton, 21.2.37. R. N. Belgrove, E. H. Dally, D. J. H. Lay, H. P. Pleasance, to No. 142 (Bomber) Squadron, Andover, 21.2.37. R. D. Baughan, N. C. Beck, T. W. Piper, to No. 144 (Bomber) Squadron, Hemswell, 21.2.37. S. H. Cruise, to No. 151 (Fighter) Squadron, North Weald, 21.2.37. N. L. Smith, to No. 224 (General Reconnaissance) Squadron, Boscombe Down, 21.2.37. F. R. Jeffs, H. G. Mossford, to No. 269 (General Reconnaissance) Squadron, Abbotsinch, 21.2.37.

Equipment Branch

Wing Commanders.—A. J. Briddon, to R.A.F. Depot, Aboukir, Egypt; for Equipment duties, 2.3.37. F. R. Wilkins, to Aircraft Depot, Hinaidi, Iraq; for Equipment duties, 2.3.37. F. E. J. Coates, to Headquarters, Bomber Command, Uxbridge; for Equipment Staff duties, 2.3.37.

Squadron Leader.—A. P. Woollett, to Directorate of Equipment, Air Ministry, 2.3.37.

Flight Lieutenants.—H. E. Young, to R.A.F. Station, Amman, Transjordan, 2.3.37. M. V. O'B. Atkinson, to Headquarters, Bomber Command, Uxbridge, 4.3.37. A. Connock, A. E. Connolly, to Aircraft Depot, Hinaidi, Iraq, 11.2.37.

Flying Officers.—F. G. Metcalf, to R.A.F. Station, Usworth, 2.3.37. L. Doyle, to Aircraft Depot, Hinaidi, Iraq, 11.2.37. W. J. Stutchbury, to Aircraft Depot, Karachi, India, 11.2.37. E. E. Copper, to R.A.F. Station, Dishforth, 19.2.37.

Accountant Branch

Wing Commander.—A. W. P. Phillips, O.B.E., to Aircraft Depot, Hinaidi, Iraq; for Accountant duties, 11.2.37.

Flying Officers.—A. Gollan, to R.A.F. Station, Donibristle, 25.2.37. W. N. Hibbert, to R.A.F. Station, Kalafrana, Malta, 13.2.37.

Medical Branch

Group Captains.—R. J. Aherne, M.C., to R.A.F., General Hospital, Hinaidi, Iraq; to command, 11.2.37. T. Montgomery, to Headquarters, R.A.F., India, New Delhi; for duty as Principal Medical Officer, 11.2.37.

Wing Commander.—E. A. Lumley, M.C., to Headquarters, R.A.F., Iraq, Hinaidi; for duty as Deputy Principal Medical Officer (Hygiene), 11.2.37.

Flight Lieutenants.—A. S. Amsden, H. E. Bellringer, to Headquarters, R.A.F., Iraq, Hinaidi, 11.2.37. R. F. Wynroe, to R.A.F. Station, Upper Heyford, 1.3.37. O. S. M. Williams, to R.A.F. Station, Upwood, 24.2.37.

Flying Officers.—V. D. Jones, to No. 28 (Army Co-operation) Squadron, Ambala, India, 11.2.37. R. C. O'Grady, to No. 5 (Army Co-operation) Squadron, Chaklala, India, 11.2.37. C. C. Barker, F. L. Whitehead, to Headquarters, R.A.F., Iraq, Hinaidi, 11.2.37. E. H. E. Crose, to R.A.F. Station, Hornchurch, 3.3.37. J. R. R. Jenkins, to R.A.F. Station, Kai Tak, Hong Kong, 25.2.37.

Chaplains Branch

Revd. R. Rees, to Headquarters, R.A.F., Iraq, Hinaidi; for duty as Chaplain (C. of E.), 11.2.37. Revd. N. F. Porter, to R.A.F. Station, Halton; for duty as Chaplain (C. of E.), 24.2.37. Revd. H. F. Daniels, to R.A.F. Station, Halton; for duty as Chaplain (Methodist), 1.3.37.

THE RIGHT ENGINES for LIGHT AEROPLANES

Current Types Reviewed : Several New Examples Now in Full Production

Aero Engines

THERE are several ultra-light aircraft on the market which require a reliable and compact little engine with a power output of about 30 h.p., while for certain types there is a tendency, if not among all the makers, then among those who fly the aircraft, to favour a slightly higher output, say, 40 h.p. maximum. Aero Engines have in the second class made progress with the new 1½-litre side-valve engine and this should shortly be available, while in the class below 30 h.p. the 803 c.c. Sprite engine with overhead valves is offered with dual B.T.H. magnetos and an impulse starter.

803 C.C. SPRITE AIR-COOLED FLAT TWIN
Normal Output: 22.7 h.p. at 2,850 r.p.m.
Max. Output: 24.3 h.p. at 3,150 r.p.m.
Fuel Consumption: 1½ gal./hr. cruising.
Weight: 77.25 lb.

1½-LITRE AIR-COOLED FLAT TWIN
Normal Output: 38/40 h.p. at 2,800 r.p.m.
Max. Output: 42/45 h.p. at 3,500 r.p.m.
Weight: 110 lb.
(*Makers: Aero Engines, Ltd., Kingswood, Bristol.*)

British Anzani

With the exception of one small but important modification—the fitting of roller-bearing cam rockers—this two-cylinder engine is unchanged. The firm is very busy with Government aero work.

1,100-C.C. INVERTED AIR-COOLED VEE-TWIN
Normal Output: 26 h.p. at 2,500 r.p.m.
Max Output: 34 h.p. at 3,000 r.p.m.
Weight: 99 lb. (without reduction gear).
(*Makers: British Anzani Engineering Co., Ltd., Kingston-on-Thames.*)

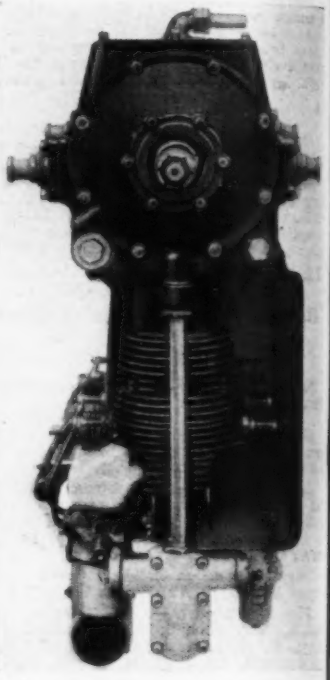
Carden

Being a special adaptation of a well-tried car engine, the Carden is exceptional among light aero engines in having a water-cooled vertical block of four cylinders. There are several advantages in this design in maintenance, running costs and reliability, but until the advent of the Carden the additional weight had generally been prohibitive.

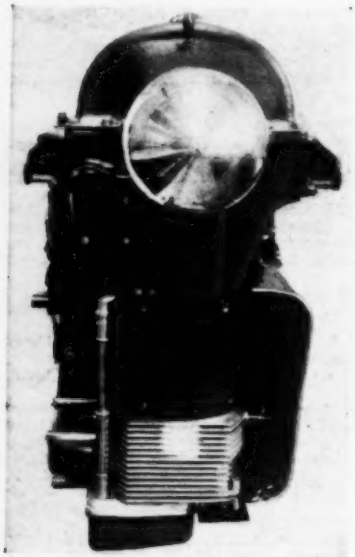
THE CARDEN 1,172-C.C. WATER-COOLED FOUR-CYLINDER
Normal Output: 30 h.p. at 3,300 r.p.m.
Max. Output: 33 h.p. at 3,500 r.p.m.
Fuel Consumption: 2.02 gal./hr. cruising.
Oil Consumption: 0.4 pt./hr. cruising.
Weight: 130 lb.
(*Makers: Carden Aero Engines, Ltd., Heston Airport, Middlesex.*)

Carden-Baynes

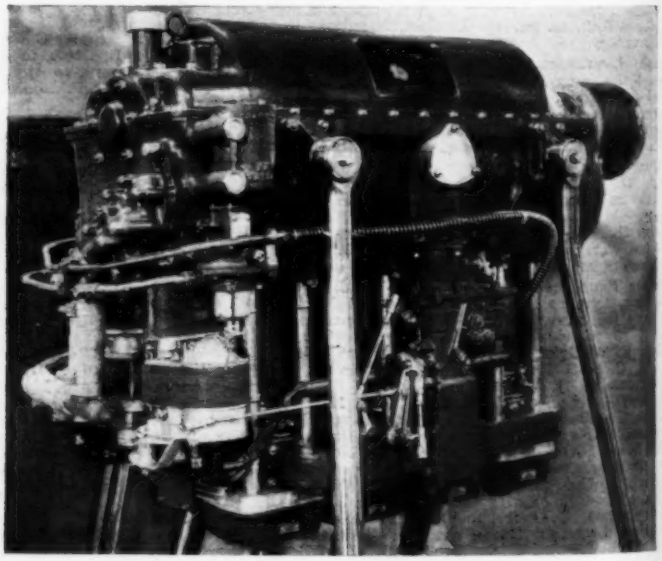
Recently introduced for powering the light twin-engined pusher aircraft of the same name described in this issue, the Carden-Baynes engine has been developed from the Carden engine, but has several special features, notably, a Centric "step-up" blower running at 1.1 times engine speed, an airscrew shaft extension splined to the crankshaft for internal wing installation, dry-sump lubrication with extra scavenge pump and separate oil tank. The engine has a 6: 1 compression ratio, and a three-point mounting on its side. This last feature means that any vibration is taken along the plane of the wing and does not exert vertical stresses. Air is taken in through louvres below the wing and the outlet is through louvres on the upper surface.



This airscrew-end view of the Weir engine shows its slender lines and the front aspect of the under head camshaft assembly.

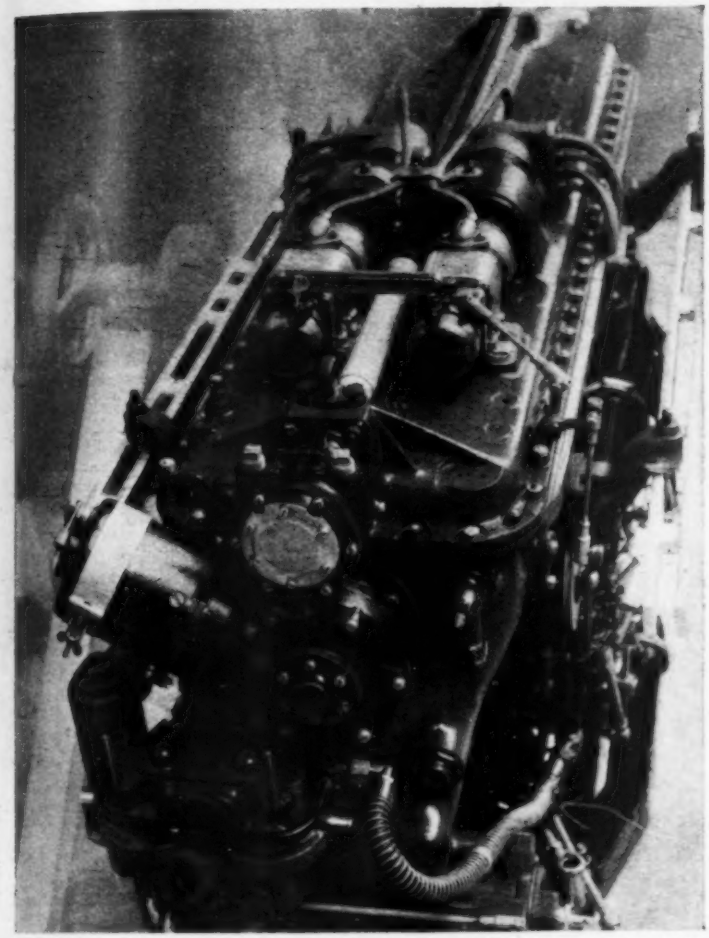


The well-known Cirrus front elevation is quite a lesson in clean lines.

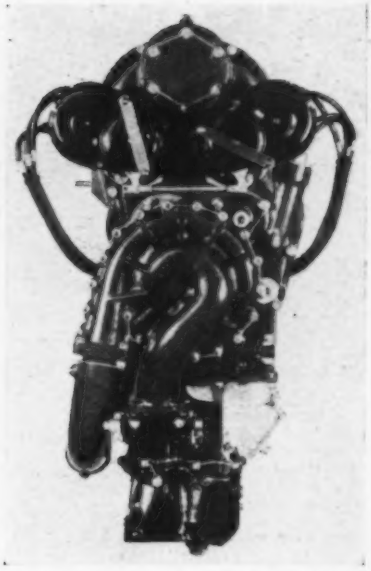


On this show model Cirrus Minor ; the accessories are better represented visually than verbally. (*Flight* photograph.)

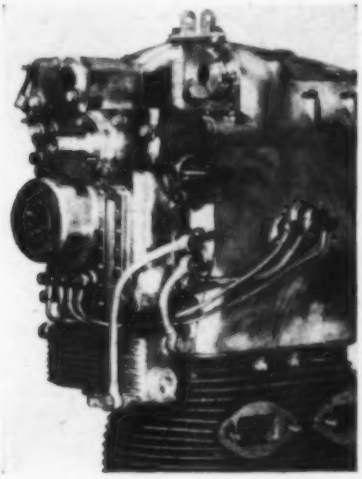
A REPRESENTATIVE SELECTION



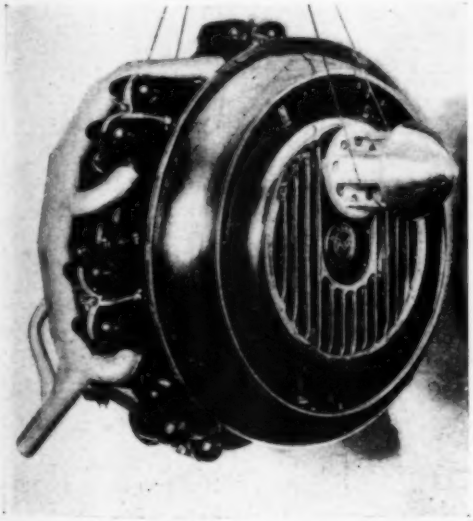
Snug as limpets in crevices are the Gipsy Six II accessories. (*Flight* photograph.)



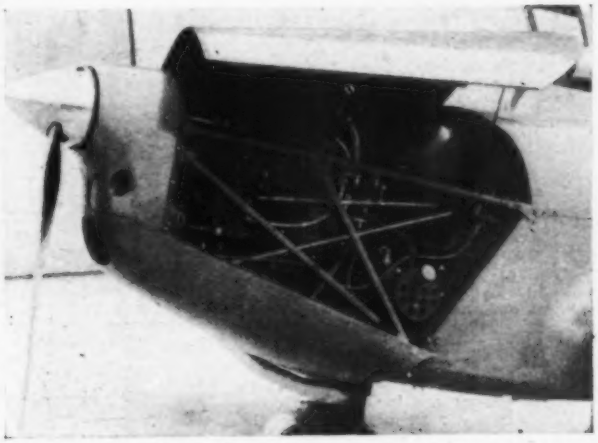
Still strange to the eye of the private owner, a supercharger coils round at the rear of the Phillips and Powis B.6.S.



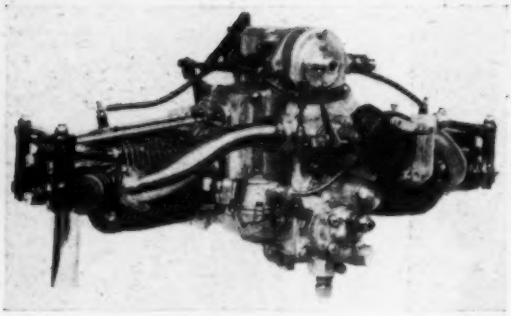
The close-up of the Scott shows the new, small, extra, finned sump and its attachment.



The seven-cylinder radial Pobjoy Niagara III. Cowling and baffles are integral parts of the engine.



A Villiers-Hay Maya I installed in the Miles Whitney Straight. The miniature fire-tube boiler is the oil tank.



(Left) Symmetry and simplicity as exemplified by the Aero Engines Sprite.

(Right) Noticeable in the familiar lines of the J.A.P. flat-twin engine are the hot-spot air intake and finned oil sump.

THE CARDEN-BAYNES SUPERCHARGED WATER-COOLED FOUR-CYLINDER
Normal Output: 37 h.p. at 3,200 r.p.m.
Max. Output: 40 h.p. at 3,500 r.p.m.
(*Makers: Carden-Baynes Aircraft, Ltd., Heston Airport, Middlesex.*)

Cirrus

There are few engines behind which a pilot feels safer than the Cirrus. The design is simple and straightforward, the valve gear is totally enclosed and the grouping of external fittings and accessories, which can be removed with the top half of the crankcase without any other derangement, gives good accessibility. Notable running economy is achieved with the Cirrus Minor, and it is a most suitable power unit for the small twin-engined aircraft which seem to be gaining in popularity.

CIRRUS MAJOR MARK II INVERTED, AIR-COOLED, FOUR-CYLINDER IN LINE
Normal Output: 135 h.p. at 2,200 r.p.m.
Max. Output: 148 h.p. at 2,450 r.p.m.
CIRRUS MINOR INVERTED, AIR-COOLED, FOUR-CYLINDER IN LINE
Normal Output: 82 h.p. at 2,300 r.p.m.
Max. Output: 90 h.p. at 2,600 r.p.m.
Fuel Consumption: 3½-4 gal./hr. cruising.
Oil Consumption: 1-1½ pt./hr. cruising.
Weight: 105+or−5 lb.
(*Makers: Blackburn Aircraft, Ltd., Engine Department, Brough, East Yorkshire.*)

Coventry Victor

A new flat four-cylinder engine will undergo its official tests during the next week or two. The engine is designed with a view to providing a reliable and cheap unit developing from 40 to 50 h.p. for the private owner.

(*Makers: Coventry Victor Motor Co., Ltd., Cox Street, Coventry, Warwickshire.*)

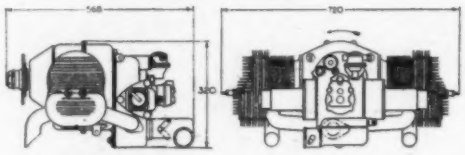
De Havilland

Gipsy Six Series I engines are well known to every private owner and the Series II seems likely to gain equal fame. It must be remembered that the good name of Gipsy engines is based on some ten years of experience and excellent service. The Series I engine is noted for its great reliability, longevity and smoothness of operation to which very many records and long-distance flights bear witness. Although it has been kept simple and has no greater frontal area than the Major a full complement of accessories and equipment is incorporated, including electric starter, duplex fuel pumps, twin carburettors, and dual ignition, while airscrew boss and spinner, air scoops and exhaust manifold flanges are included with the engine. Alternative mountings are available.

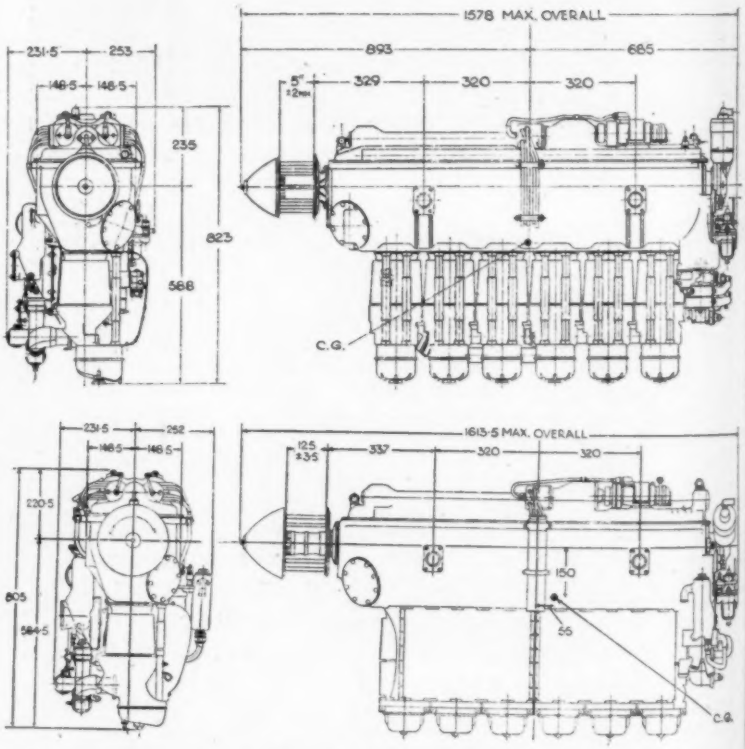
The Series II Gipsy Six engine is designed for use with the "1,000-" size De Havilland v.p. airscrew and is suitable for operation on leaded fuels. The compression ratio of 6.1 : 1 (compared with the 5.25 : 1 of the Series I engine) allows a lower specific fuel consumption.

At "designed altitude" the cruising output of the Series II Six with v.p. airscrew (153 h.p.) is 28 per cent. higher than the Series I under the same conditions; the take-off figure of 202 h.p. is 13 per cent. higher and as has been previously observed the Series II engine is designed to give higher continuous output.

Having figured in nearly every private flying activity since its early successes in long-distance flights, the Gipsy four-cylinder Major I has built up a most enviable reputation.



Side valves are employed on the new Aero Engines' 1½-litre engine illustrated in the line drawing on the left.



Installation drawings of the Gipsy Six Series I (top) and Series II (below) show just how the outline and accessories differ.

GIPSY SIX SERIES I INVERTED, AIR-COOLED SIX-CYLINDER IN LINE
Normal Output: 185 h.p. at 2,100 r.p.m.
Max. Output: 200 h.p. at 2,350 r.p.m.
Fuel Consumption: 9-9½ gal./hr. cruising.
Oil Consumption: 1-4 pt./hr. cruising.
Weight: 468+or−7½ lb.

GIPSY SIX SERIES II INVERTED, AIR-COOLED SIX-CYLINDER IN LINE
(With 77-octane fuel and fixed-pitch airscrew)
Normal Output: 185 h.p. at 2,100 r.p.m.
Max. Output: 205 h.p. at 2,400 r.p.m.
V.P. Rating: 205 h.p. at 2,400 r.p.m.
Fuel Consumption: 10-10¾ gal./hr. cruising, 16 gal./hr. max.
Oil Consumption: 3-5 pt/hr.
Weight: 469+7½ lb. (fixed pitch).

GIPSY MAJOR I INVERTED, AIR-COOLED, FOUR-CYLINDER IN LINE
Normal Output: 120 h.p. at 2,100 r.p.m.
Max. Output: 130 h.p. at 2,350 r.p.m.
Fuel Consumption: 8½ gal./hr. cruising.
Oil Consumption: 1⅞ pt./hr. cruising.
Weight: 300 lb.+or−5 lb.
(*Makers: The De Havilland Aircraft Co., Ltd., Hatfield Aerodrome, Herts.*)

J.A.P.

The J.A.P. engine, at present produced to power the Aeronca monoplane, has a large finned oil compartment separate from and below the alloy crankcase. The valve and push-rod enclosure is very neat and a well-arranged hot-spot intake is built round the exhaust pipe.

1,860-c.c. J.A.P. AIR-COOLED FLAT-TWIN
Normal Output: 30 h.p. at 2,400 r.p.m.
Weight: 115 lb.
(*Distributors: Aircraft Exchange and Mart, Ltd., 7, Park Lane, London, W.1.*)

Phillips and Powis

The licence to build the four Menasco models, the Buccaneer and Pirate in supercharged and normally aspirated forms, has been held for some months by Phillips and Powis. These engines are well known in America and in this country the C.4.S. and B.6.S. will be of particular interest in bringing supercharging to the private owner. A Miles Peregrine is to be tried with supercharged B.6.S. engines.

MODEL C.4 INVERTED, AIR-COOLED, FOUR-CYLINDER IN LINE
Output: 125 h.p. at 2,175 r.p.m.
Weight: 290 lb.

MODEL B6 INVERTED, AIR-COOLED, SIX-CYLINDER IN LINE
Output: 160 h.p. at 1,975 r.p.m.
Weight: 385 lb.

MODEL C.4.S. SUPERCHARGED, INVERTED, AIR-COOLED, SIX-CYLINDER IN LINE
Output: 150 h.p. at 2,260 r.p.m. at 3,000 ft.
Weight: 305 lb.

MODEL B.6.S. SUPERCHARGED, INVERTED, AIR-COOLED SIX-CYLINDER IN LINE
Output: 200 h.p. at 2,250 r.p.m. at 4,000 ft.
Weight: 415 lb.
(*Makers: Phillips and Powis Aircraft, Ltd., Woodley Aerodrome, Reading, Berks.*)

Pobjoy

Niagara engines have a long period of air-line and private service to their credit in several types of aircraft, including the Scion and Scion Senior, Monospar and B.A. Swallow. The Niagara has lately emerged in its Mark IV form and was shown in a Monospar at the recent B.I.F. in Birmingham. Performance figures are not yet available for the new series, but externally there seems to be little difference between the Mark III and IV engines. The company are progressing with the development of a new two-row radial engine. Their Cataract engine is, in effect, a derated Niagara.

NIAGARA III AIR-COOLED RADIAL SEVEN-CYLINDER
Normal Output: 88 h.p. at 3,300 r.p.m.
Max. Output: 95 h.p. at 3,650 r.p.m.
Fuel Consumption: 5 gal./hr. (70 per cent. power).
Oil Consumption: 1½ pt./hr.
Weight: 157 lb.

CATARACT II AIR-COOLED RADIAL SEVEN-CYLINDER
Normal Output: 84 h.p. at 3,200 r.p.m.
Max. Output: 90 h.p. at 3,500 r.p.m.
Weight: 148 lb.
(*Makers: Pobjoy Airmotors and Aircraft, Ltd., Rochester Aerodrome, Kent.*)

Scott

The two-cylinder Scott is a good example of the extreme simplicity of a two-stroke engine. It has only five main moving parts, and is very economical. Behind the design are many years of experience with motor cycle engines, but it is itself specially developed for ultra-light aircraft. A spur-type reduction gear is fitted. In the newest form, the A.2.S Mark II Flying Squirrel, to give the full title, has an auxiliary scavenge sump. Parts and full instructions for modifying engines already in use can be obtained from the makers on application.

THE A.2.S. MARK II INVERTED, AIR-COOLED, IN LINE, TWIN
Normal Output: 16 h.p. at 3,200 r.p.m.
Max. Output: 28 h.p. at 4,000 r.p.m.
Fuel Consumption: 0.56 lb./b.h.p./hr. cruising.
Oil Consumption: 0.03 lb./b.h.p./hr. cruising.
Weight: 85+or−5 lb.
(*Makers: Scott Motor Cycle Co., Shipley, Yorks.*)

Villiers-Hay

The Maya I engine which seems destined to make quite a name for itself is outstanding for its compactness. It is claimed that the "radial" cylinder heads with widely splayed valves give more efficient cooling than more usual types. The engine, which has a 6 : 1 compression ratio, is free from vibration, and all moving parts are designed with a 33⅓ per cent. strength safety margin over maximum engine speed. The top cover can be simply removed without disturbing the back cover and drives.

It is hoped that the Maya II engine of about 170 h.p. maximum will shortly be in production.

THE MAYA I INVERTED, AIR-COOLED, FOUR-CYLINDER IN LINE
Normal Output: 120 h.p. at 2,300 r.p.m.
Max. Output: 135 h.p. at 2,700 r.p.m.
Fuel Consumption: 0.58 pt./b.h.p./hr. cruising.
Oil Consumption: 1.5 pt./hr. cruising.
Weight: 280 lb.
(*Makers: Villiers-Hay Development, Ltd., 48, Albemarle Street, London, W.1.*)

Weir

An engine designed for use in the Weir Autogiro but eminently suitable for powering other light aircraft, the Weir is a most carefully designed unit with underhead camshaft. A petrol pump and dual ignition are included in the equipment. The engine, which is being prepared, for a type test, now has the magneto housed on the crankcase end cover instead of the cam box.

2,000-C.C. WEIR INVERTED, AIR-COOLED, FOUR-CYLINDER IN LINE
Normal Output: 45 h.p. at 2,300 r.p.m.
Max. Output: 50 h.p. at 2,550 r.p.m.
Weight: 112 lb.
(*Makers: G. and J. Weir, Ltd., Cathcart, Glasgow, Scotland.*)

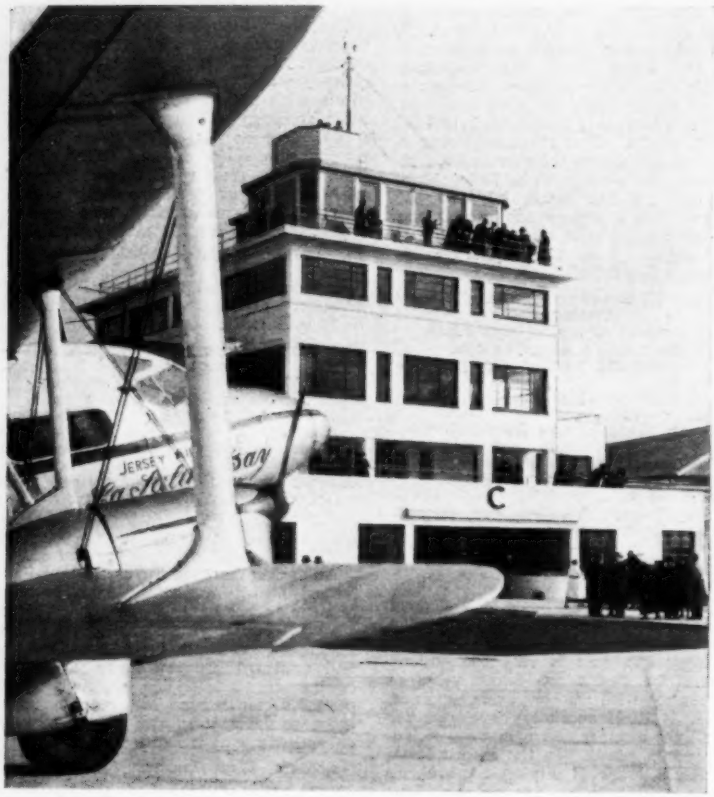
Forthcoming Events

March 18. R.Ae.S. (Coventry Branch) Lecture: "Navigation," by Sqn.-Ldr. Godsave. Armstrong Siddeley Canteen, 8.15 p.m.
March 27-30. Yorkshire Gliding Club: Easter Meeting, Sutton Bank.
March 30—April 12. Ely Aero Club: Easter Instructional Course.
April 3. Rugby; R.A.F. v. Army, Twickenham.
April 8. R.Ae.S. Lecture°: "Control Problems," by Mr. A. G. Pugsley.
April 10. Aero Golfing Society: Martlesham Match.
April 22. R.Ae.S. Lecture°: "Power Plant Trends," by Mr. G. J. Mead.
May 6. Aero Golfing Society: Instone Trophy.
May 9. R.Ae.S. Garden Party, Great West Aerodrome, Hayes.
May 12-19. Austrian Aero Club: Austrian Whitsun Flight.
May 13. Leicester Airport Coronation Air Display.
May 15. Cardiff Aero Club: Coronation Rally.
May 15-18. Yorkshire Gliding Club: Whitsun Meeting, Sutton Bank.
May 26—June 6. Brussels Aero Show.
May 27. R.Ae.S. Wilbur Wright Lecture: "Turbulence," by Dr. Theodor von Karman. Science Museum, South Kensington.
May 29. Empire Air Day.
May 29-31. London-Isle of Man Race and Round-the-Island Contests.
June 4-6. York and Leeming F. Clubs: International Meeting, York.
June 12. Bristol and Wessex Aeroplane Club: Garden Party, Whitchurch.
June 15-20. Magyar Pilota Picnic, Hungary.
June 20. R.Ae.C. of Belgium: Gordon Bennett Balloon Race, Brussels.
June 26. Royal Air Force Display, Hendon.
June 28. S.B.A.C. Display Hatfield.
July 1. Aero Golfing Society: *Flight* Trophy.
July 3. Newcastle-on-Tyne Aero Club: London-Newcastle Race.
July 3. Ramsgate Airport. Official Opening.
July 10. Cardiff Aeroplane Club: London-Cardiff Race.
July 11. Italian Aero Club: Circuit of Rome.
July 23—August 1. Swiss International Meeting.
July 24. Plymouth Aero Club: Devon Aviation Meeting.
July 31. Cinque Ports Flying Club: Folkestone Aero Trophy Race.
July 31—August 2. Yorkshire Gliding Club: Opening Meeting. Sutton Bank.
August 1-14. Yorkshire Gliding Club: Instructional Camp, Sutton Bank.
August 1-31. New York—Paris Air Race Flights.
August 2. Thanet Aero Club: Thanet Air Day, Ramsgate.
August 14-22. Yorkshire Gliding Club: Open Contest, Sutton Bank.
August 21. Thanet Aero Club: Aviation Meeting.
August 28 and 29. Cinque Ports Flying Club: Lympne International Rally and Wakefield Trophy Race.
September 10-11. R.Ae.C.: King's Cup Race.

These lectures take place at the Royal Society of Arts 18, John St., London, W.C.2, at 6.30 p.m. Admission is by ticket obtainable through a member

COMMERCIAL AVIATION

— AIRLINES — AIRPORTS —



JERSEY'S AIRPORT : A sunny impression of the well-planned terminal building of Jersey's new airport, with a Jersey Airways' D.H. 86 in the foreground. The airport was officially opened on Wednesday of last week. (*Flight* photograph.)

THE WEEK AT CROYDON

Weather or No : De-icers : Confession : Another "Replacement" : Emergency Airport

ONE day last week there was an outbreak of uninformed criticism because on a certain day, it was alleged, Imperial Airways cancelled for ice-formation, whereas all other companies flew as usual. Ice formation is a tricky subject for any lay journalist, for there are so very many points a pilot has to consider, and a cancellation or decision to start is an individual matter.

The story was that all the foreign machines which started did so because they were fitted with de-icing equipment, whereas Imperial machines could not leave because they were not. Actually the facts are far otherwise, and I doubt if a single foreign machine which left that day was completely equipped, though it is true that firms such as Air France and K.L.M. have a few machines so fitted. The whole thing was a matter of the particular route covered and the particular time of the service. Later, conditions improved and the foreign machines left. In their eagerness to blame Imperials the newspapers concerned failed to mention that the Imperial mid-day service ran and was duplicated. A little time ago the boot was on the other foot, and certain routes not flown by Imperials were impossible, whereas all their services were operating as usual.

Talking about de-icers, I am told by both French and Dutch pilots that the equipment is eminently satisfactory and that the peril of ice formation would be non-existent if all machines had it. If that is so, why aren't all machines so fitted?

It is bad luck for Irish Sea Airways that Baldonnel has been under snow for such a long time. Rumour went round Croydon on Saturday to the effect that there was tremendous activity in the Olley hangar, where skis were being fitted to machines for the Irish service.

It looks as though British Airways have come to Croydon for good. Mr. Campbell-Orde arrived from Scandinavia by K.L.M. last week and has been seen around Croydon on most days since, and both Mr. Banks and Mr. Higgins have settled nicely into their old Croydon groove. Capt. Macintosh, also of B.A., is an old Croydonian who has returned to the fold. He used to be known as "All-weather Macintosh." There are no special "all-weather pilots" these days. People have acquired wisdom.

The early morning newspaper traffic to various continental cities steadily increases year by year, and, for example, the Amsterdam machine regularly carries a weight equivalent to five passengers or so. The habit of reading English newspapers at the breakfast table has developed with the growth of air transport, and for this export trade we have to thank the fact that linguistically, at any rate, the average foreigner is better educated than our own nationals. By comparison, far fewer foreign periodicals are sent over here either by air or by surface transport.

There is not a single office now to be had anywhere in the terminal building, and many firms need extra accommodation. The fact that more offices were badly needed was pointed out to the authorities a year or two ago, and the usual steps have been taken. As far as one can ascertain there is not even an expansion scheme on paper, though this may be a libel and a marvellous scheme may exist, and may continue to exist indefinitely, on paper. The efficiency of those who deal with such matters is best illustrated, without comment, by their actions, or lack of them. Some two or three years ago the roof above one of our corridors sprang a leak. Water collected above the ceiling and seeped through. Their remedy was to bore four or five large holes in the ceiling. Water then poured on to a concrete floor and was kept under control by men with mops. These holes in the ceiling are still there, and, whilst traffic prevents stalagmites from forming, a lovely crop of stalactites is said to be forming on the ceiling.

There is much excitement about a new airport at Lullingstone, Kent, which is to replace Croydon. We have heard

all this before, and this time, I hope, those concerned will get a geological survey done to find out whether the surface will take an extra spot of rain. Architecturally, Croydon may be a matter of inextinguishable mirth, and the surface may be like a contour map of a rough night at sea, but at least we can keep on using the place. Amsterdam, one of the best-drained aerodromes in Europe (it needs to be, having been originally a vast lake and being even now below sea level), is only just usable this winter.

On Sunday Croydon experienced a complete black-out around lunch time, and two K.L.M. D.C.2 machines landed at Gravesend, discharged passengers, and had them up in London with considerable dispatch. The air traveller, thanks to an adequate emergency airport just where it is needed, was scarcely interfered with. Lympne was impossible, and but for Gravesend the passengers would probably have had to return to Holland. So far as I can gather the authorities propose to abandon Gravesend to the builder without a sigh.

A. VIATOR.

FROM SAND TO SWARD

Jersey's New Airport is Officially Opened

FROM the point of view of the visitors, neither Jersey itself nor its new airport could have had more suitable weather than that experienced for the official opening of the long-awaited air transport centre.

Jersey Airways' morning service left Heston in QBI conditions, with visibility of the 800-yard order, and between Farnborough and Portsmouth the leading D.H.86, piloted by Mr. Israel, flew through snowstorms so thick that the ground was occasionally lost entirely. This ground, in any case, was covered with a fine mantle of snow. The Channel made a coloured pattern of sunlight and shadow as the weather steadily improved.

The new airport, only previously seen by the majority of the passengers in the course of construction—as an ugly brown patchwork—was bathed in warm spring sunlight, and the outline of the island of Guernsey, some twenty-five miles away, was clearly seen beyond the boundary at the end of the longest run. The contrast could not have been more effective.

Although its whole landing area is not quite finished, the airport, which lies some five miles to the west of St. Helier, is most impressive to the newcomer, who is accustomed to less complete and handsome layouts. The surface resembles a tennis lawn in texture, and the white terminal building lying between the two large hangars, is one of the very best of its kind. The building is economically planned yet roomy, and the control officers—Lt. Phillips and Mr. Roche—have a view of the entire landing area. As far as is possible all obstructions are grouped in one spot, and the D/F and normal aerials will all lie to the east of, and behind, the terminal buildings. There are four G.E.C. floodlights, and a concrete white line has been laid down along the entire length of the 900-yard (E-W) run, which, at the same time, has obstruction-free approaches. The total present area is 77 acres, and the entire project cost the States about £128,000.

A particularly interesting feature of the terminal building is that loud speakers have been installed at all key-points so that lost passengers may be found ready for a time-table departure, and so that officials and others may be collected as and when necessary.

A number of important people spoke before the airport was officially opened by Mrs. Coutanche, the wife of the Bailiff of Jersey, who opened the proceedings with a speech of introduction. The Bailiff of Guernsey, Mr. Carey, followed with congratulations, and Mr. J. G. Gibson, of the Air Ministry, replied for the visitors.

Mr. Guy de Gruchy, the president of the Airport Committee, gave an unequivocal account of the history of the airport, which was first mooted in 1932. He showed how the optimistic estimates entertained during the earlier days of the scheme proved to be ridiculously low and how the landowners and others concerned helped the committee. No litigation had been necessary in dealing with some eighty owners.

Jersey Airways will lose a vast amount of good publicity now that the company's machines are no longer landing on the beach in the direct view of the inhabitants of and visitors to St. Helier, but the loss should be amply balanced by the convenience, both from the maintenance and time-table-planning point of view, of the new airport. This will now be their centre of operations, and the company's fleet will normally be housed and maintained there.

Scion Senior for Jersey

JERSEY AIRWAYS are trying out a four-engined Short Scion Senior on their regular services for a few weeks. This machine has about the same passenger capacity as the D.H.89, which has been used to carry the company's lighter loads.

And Now Another

PLANS for a service between Newcastle and Norway are under consideration and developments are expected shortly. Several important airline concerns are understood to be interested in the project, and it is expected that the service will be run jointly between English and Norwegian companies. A service between Aberdeen and Oslo is expected to start this spring.

R.A.A. Replaces L.A.N.A.

THE French air line Lignes Aeriennes Nord-Africaines ceased to function at the end of 1936, and with it the routes which it operated, i.e., Algiers-Oran and Algiers-Constantine-Bone-Tunis. The French Government decided to entrust to the company Regie Air-Afrique the operation of a route between Casablanca and Tunis. The new route was due to start work on March 15, and it is reported that M. Henri Germain, of L.A.N.A., has sold the aeroplanes and ground station equipment to Air-Afrique. The machines, it may be remembered, are three De Havilland Dragons, but it is reported that the company will soon dispose of these and re-equip with four Caudron Goelands. The L.A.N.A. personnel has been transferred to R.A.A.

Aero-maritime Starts

WHEN last week's homeward-bound Air France South American mail machine left Dakar for Toulouse, she carried mail to the weight of 1,220 lb.—a record for the normal service. The explanation is that the South American mail was augmented at Dakar by that from the West African coastal towns, which was brought on the inaugural return flight of Aero-Maritime's service. Incidentally, the Air France machine was making the 161st regular ocean crossing.

Extended Agreements

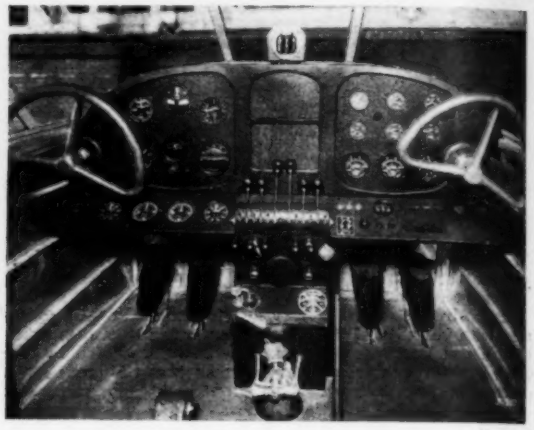
TWO agreements between Imperial Airways and the Government have recently been extended. One is for the England-South Africa service, the agreement for which has been extended until June 1, owing to the fact that it will not be possible to inaugurate the through flying-boat service on April 1 as was originally intended. It does not appear even certain that the new scheme will be started on the later date, since power has been reserved to make a further extension if necessary. The rate of subsidy for the period between April 1 and June 1 will be reduced to £28,000 per annum, mainly because of the continued use of machines for which full obsolescence provision had already been made.

The second extension is for the Khartoum-West African service. This agreement also terminated on March 31, but it is proposed to continue it, with provision for extensions to Accra and Takoradi when the aerodromes at these places are available, for a further period of twelve months. The present weekly service terminates at Lagos. The subsidy will be payable monthly in arrear at the rate of £250 for each weekly flight in either direction, subject to an overriding maximum of £25,000 per year.

Commercial Aviation

BEECH'S "TWIN"

High-performance Beechcraft Monoplane : Wright or Jacobs Engines Give a Cruising Speed of 190 m.p.h. or More



The fine lines ot the Beechcraft M.18 are brought out in the flying view above. Note, on the instrument panel (right), the central space for Lear radio.

IMBUED with a number of excellent qualities, including an outstandingly good performance and a disposable load of about 2,500 lb., and backed with Walter Beech's experience with his successful range of back-staggered biplanes, the new Beechcraft M.18 twin-engined cantilever monoplane should quickly find a place for itself among commercial operators and the more well-to-do private owners.

The low wing incorporates a single spar of welded tubes with a dural girder structure half-way to the tip. This arrangement is claimed to avoid complication near the root. The fuselage is mainly of conventional smooth-stressed skin construction, but includes a steel tube spar to take engine, undercarriage and wing stresses. The form of construction used leaves the cabin unobstructed.

Alternative seating arrangements are two seats and a couch or six seats. A lavatory is standard.

The flying equipment includes dual controls and built-in two-way Lear radio.

Provisional prices of the Jacobs- and Wright-powered models in this country are £9,800 and £10,200, though it is expected that these will be revised.

PRINCIPAL DATA

	2-285 h.p. Jacobs L5.	2-285 h.p. Wright R-760 E2.
Take-off power	600 h.p.	760 h.p.
Cruising power	420 h.p. (8,000 ft.)	420 h.p. (10,000 ft.)
Cruising speed	190 m.p.h.	192 m.p.h.
Landing speed (with flaps) ...	58 m.p.h.	58 m.p.h.
Initial climb	1,250 ft./min.	1,250 ft./min.
Service ceiling	19,000 ft.	20,000 ft.
Single-engine ceiling	8,000 ft.	8,500 ft.
Range (ultimate), approx. ...	820 miles	830 miles
Range (safe), approx.	720 miles	730 miles
Consumption per hour	29.1 gall.	29.1 gall.
Petrol (standard tanks)	133 gall.	133 gall.
Oil	10.8 gall.	10.8 gall.
Gross weight	6,500 lb.	6,500 lb.
Tare weight	3,920 lb.	4,100 lb.
Useful load	2,580 lb.	2,400 lb.
Span	47 ft. 8 in.	
Length	31 ft. 11 in.	
Height	9ft. 5 in.	
Undercarriage track	12 ft. 11 in.	
Wing loading	18.7 lb./sq. ft.	

The Goods—Here . . .

CONSIDERABLE interest attaches to a private company recently registered at Somerset House under the title "International Air Freight, Ltd." Capt. W. L. Hope told *Flight* of his plans some months ago, but not until now has it become possible to refer to the new company.

Those with experience of rail and road transport will know that very considerable opportunities exist for air freight services, but they also know that it is no manner of use tackling the problem in a small way if full benefit is to be reaped. The new company seems to start with a board which is sufficiently strong to ensure that the necessary ground organisation will be provided, without which no air freight line could hope to make its mark. In addition to Capt. Hope, who will be technical director, the following important business men are shareholders: Sir Maurice Jenks, former Lord Mayor of London; Capt. Woolf Barnato, the well-known millionaire; Mr. Edward Robson, chairman of Pinchin, Johnson and Co., Ltd.; Mr. W. L. Stephenson, chairman and managing director of F. W. Woolworth and Co., Ltd.; and Sir Percival Perry, chairman of the Ford Motor Co., Ltd. The future of the new company will be watched with the very keenest interest.

. . . And in Australia

MEANWHILE Australia's first air freight company, Southern Airlines Freighters, Ltd., has been formed in Melbourne with a capital of £500,000. The company intends to break away completely from normal airline practice. It will import a fleet of seven Ju.86 diesel-engined machines and will carry freight to remote parts of the Continent at road and rail rates.

The initial service will be a direct one between Sydney and Adelaide. Passengers will be carried on this run, but, once the company is operating fully, its objective will be to carry freight only.

Two Warnings

PILOTS are requested not to fly at an altitude of less than 2,000 ft. in the vicinity of Aintree on March 18, 19 and 20, and in the vicinity of Putney and Mortlake on March 24. In each case left-hand circuits must be made and in the first case pilots are warned that the area formed by the main Liverpool-Ormskirk road, Aintree Lane and Longmoor Lane, is *not* an aerodrome.

Constructional Steelwork

A FOLDER issued by Head, Wrightson and Co., Ltd., whose London office is at 5, Victoria Street, S.W.1, deals with the constructional steelwork—including such large-span buildings as aircraft hangars—in which the firm specialise.

AN INTRIGUING TWO-SEATER

Untrammelled Design by Mr. L. E. Baynes : Flat "Buried" Engines and Pusher Airscrews Feature in the Bee Monoplane

TWIN-ENGINED security, pusher airscrews, ample performance and vision and non-acrobatic entry and exit are *desiderata* generally acknowledged by regular users of private aircraft. Singly, each of these qualities has at one time or another characterised some British light aeroplane, but the incorporation of them all, without the sacrifice of one or more of their number, is a task demanding much originality of thought and ingenuity of design.

Mr. L. E. Baynes seems to have made a very stout effort toward the efficient embodiment of all these properties in a side-by-side two-seater monoplane which has been christened the Baynes Bee. Until Capt. Hubert Broad has got well into his tests of the prototype it would be premature to discuss the machine's flying characteristics, but he is said to be quite enthusiastic.

In general the Bee is a side-by-side two-seater high-wing monoplane with two 40 h.p. Carden-Baynes pusher engines mounted within the wing.

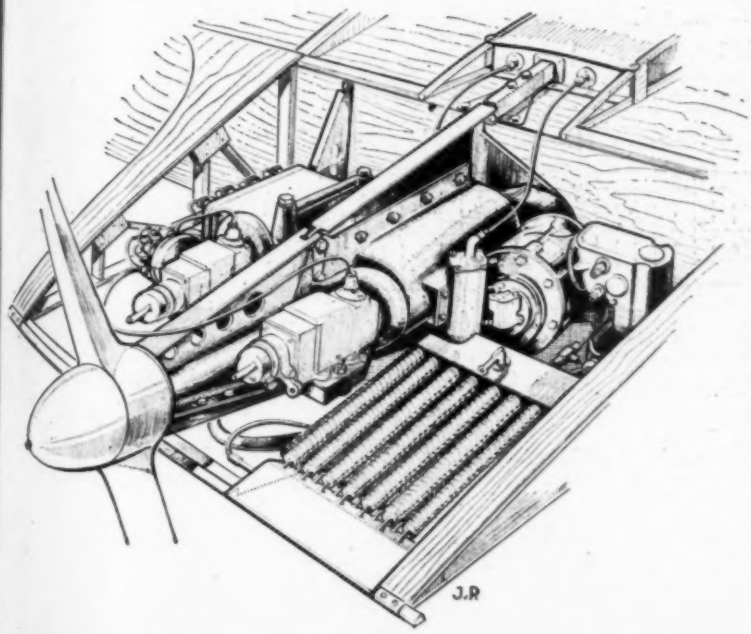
Spruce and three-ply are mainly used for the wing and fuselage, both of which components embody a number of unorthodox features.

The cantilever wing, tail plane and fin are each built round what are virtually two parallel spars with laminated webs on one side only, being joined by diaphragms or bulkheads and covered on top and bottom with ply sheeting. Thus the whole forms a substantial box beam with square booms at each corner. For this method of construction Mr. Baynes claims exceptional cheapness as compared with more conventional two-spar wings with ply covering to take the torsional bracing. He gives two main reasons: the booms of the spars do not require a bevelled outer surface changing along the span, and, as the front and rear sides of the beam are parallel, the square ply sheets on top and bottom are easier to apply than is the curved and tapered ply covering of more normal wing designs. The similarity of the spars also makes for ease of production.

The desired profile is provided by ribs slipped over the main beam and covered with fabric. The air space between the fabric and the ply is claimed to benefit the durability of the ply under severe climatic conditions and to facilitate maintenance.

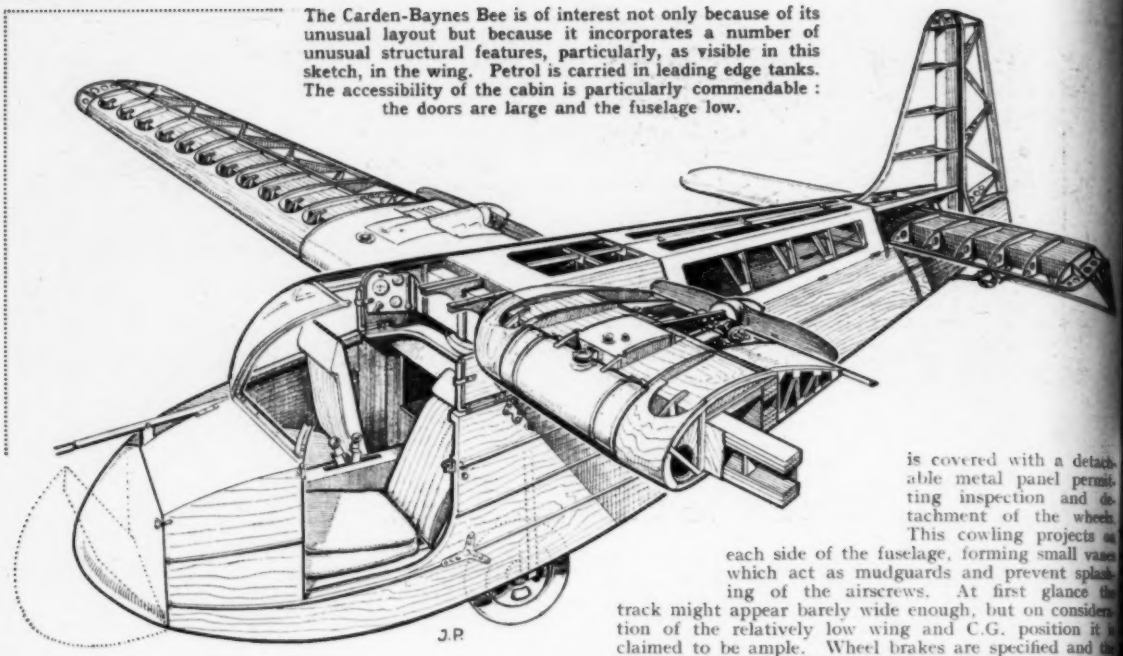
Attachment of the wing to the fuselage is made at three points, the withdrawal of pins at the two front joints allowing the wing to swivel round the third joint into a fore-and-aft position over the fuselage. For steadying purposes two light-alloy turntable rings are fitted, one to the under surface of the wing and the other to the top of the fuselage.

A straightforward plywood box with flat sides, the top being faired with a fabric-covered hinged coaming, the fuselage extends to the rear edge of the rudder to facilitate ground handling. Forward of the wing is the cabin, which has a large door on each side and is amply provided with Rhodoid panels. Entry and exit are as easy as, and outlook much better than, from a typical saloon car. Over the C.G., behind the side-by-side seats, is a luggage compartment measuring 3ft. 8in. by 2ft. 3in. by 1ft. 3in., giving a capacity of over ten



The main features of the Carden-Baynes S.P.1 engines and of their installation in the wing of the Bee are revealed in this sketch. The airscrew extension shafts are integral with the engines.

The Carden-Baynes Bee is of interest not only because of its unusual layout but because it incorporates a number of unusual structural features, particularly, as visible in this sketch, in the wing. Petrol is carried in leading edge tanks. The accessibility of the cabin is particularly commendable : the doors are large and the fuselage low.



cubic feet. Access is obtained by pulling forward the hinged backs of the seats, which, incidentally, are provided with recesses for parachutes. The usual complement of Smith's instruments is specified. Engine instruments are grouped on two small panels on each side of the cabin.

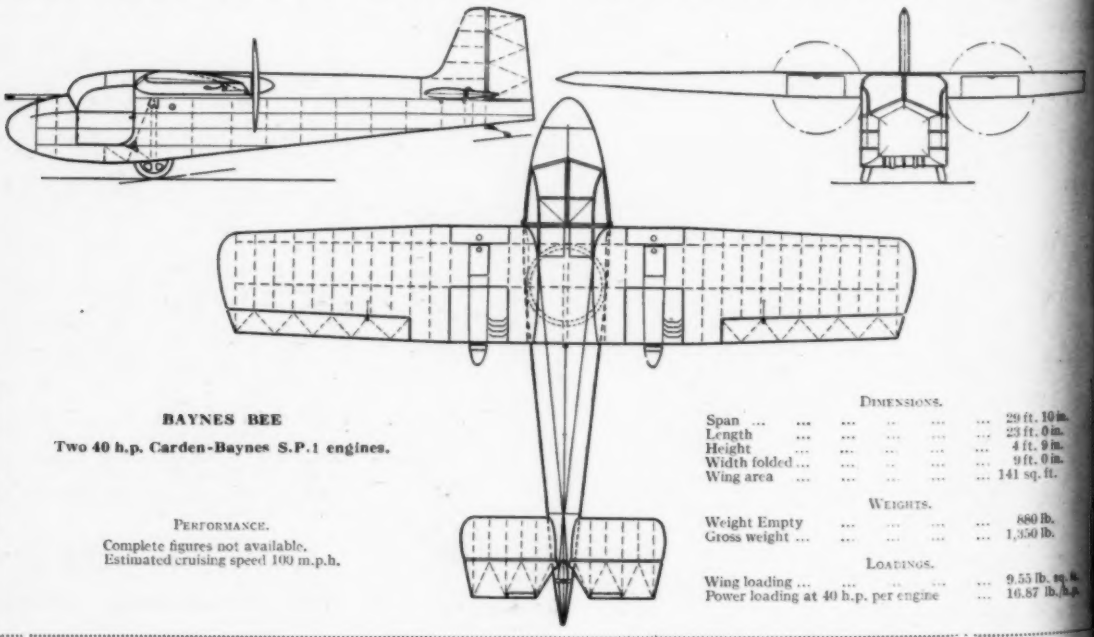
The control column is T-shaped, permitting dual control. One arm is detachable. A commendable feature is a central box structure between the seats containing the aileron control shaft, wires, dual throttle controls and the wheel operating the elevator trimming tabs.

The design of the undercarriage is another feature of unusual interest. Two cantilever oleo legs are attached internally to the fuselage sides, half the Dunlop wheels (which have a marked "toeing-out") projecting through the bottom of the fuselage. In the vicinity of the undercarriage the bottom of the fuselage is covered with a detachable metal panel permitting inspection and detachment of the wheels. This cowling projects on each side of the fuselage, forming small vanes which act as mudguards and prevent splashing of the airscrews. At first glance the track might appear barely wide enough, but on consideration of the relatively low wing and C.G. position it is claimed to be ample. Wheel brakes are specified and the tracking leaf-spring tail skid has a small roller shoe.

The two Carden-Baynes S.P.1 water-cooled four-cylinder engines are of a new type, giving, with the assistance of Centrifugal blowers running at 1.1 times engine speed, 40 h.p. at 3,500 r.p.m. The mountings are steel girder structures with sandwich plates between the cylinder block and sump casting, there being appropriate lugs for attachment to the spar, from which the whole unit is cantilevered. The engines and radiators (which lie alongside) are entirely submerged in the wing, cowling panels being hinged to the rear of the wing spar. The extension shafts for the airscrews are integral with the engines.

The air inlets for cooling are below the wing with the outlets above. Air is induced by the difference in pressure on the top and bottom surfaces of the wing and the suction of the airscrews. This arrangement, it is claimed, tends to give constant cooling.

Ten gallons of fuel are carried in leading edge tanks.



BAYNES BEE

Two 40 h.p. Carden-Baynes S.P.1 engines.

PERFORMANCE.

Complete figures not available.
Estimated cruising speed 100 m.p.h.

DIMENSIONS.

Span	29 ft. 10 in.
Length	23 ft. 0 in.
Height	4 ft. 9 in.
Width folded	9 ft. 0 in.
Wing area	141 sq. ft.

WEIGHTS.

Weight Empty	880 lb.
Gross weight	1,350 lb.

LOADINGS.

Wing loading	9.55 lb. sq. ft.
Power loading at 40 h.p. per engine	16.87 lb./h.p.